The Infantry School

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Containing the Latest Thought
on Infantry

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PREFACE

This volume of the Infantry School Mailing List contains material contributed by the following officers:

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Major John H. Burns, assisted by Captain Joseph I. Greene, edited this volume.

The Mailing List also acknowledges its deep indebtedness to Major G. V. Gurney, M. C., Canadian Reserve of Officers, for placing at its disposal his experience in helping to stop an incipient panic. The literature on panics is scanty, generalizations of value are few, and there is little, if anything, extant on how one may be stopped. His contribution, hence, is a real one.

The drawings, map reproductions, printing, and binding are the work of the enlisted personnel of The Infantry School Reproduction Plant, supervised by Captain George C. Mergens.

C. W. WEEKS,
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The Infantry School.

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CHAPTER 1

The New Infantry Regiment

INTRODUCTION

We may now consider a major change in the organization of the infantry regiment as being a certainty. That change, when finally determined, is likely to follow in general the tentative organization described in this chapter. All instruction of the present year at The Infantry School is based on this new organization, which is also undergoing a test of several months in the 29th Infantry at The Infantry School. At the end of this test, any further changes in the proposed new regiment are to be recommended to the Chief of Infantry, and the final form of the new organization is then to be decided upon.

In the pages that follow are comparative tables showing the most important changes proposed. These were formed by excerpt from complete old and new tables of organization. Where a direct comparison is possible, the old is given on the left-hand page, and the proposed new on the right. All data for the old regiment is based on Tables of Organization, C. and G.S.S., 1932.

IMPORTANT CHANGES

There are in all six things that can be listed as important changes:

(1) The proposed new regiment has four combat battalions, three rifle battalions, and a special weapons battalion. (See page 15.)

(2) The proposed new regiment contains no animals or animal-drawn transportation. The only non-motorized elements are the rifle companies except for their trains, and the foot sections of regimental headquarters company and of the three headquarters detachments of the rifle battalions. (See page 19.)

(3) All riflemen are equipped with the semiautomatic (self-loading) rifle, capable of roughly twice the rate of aimed fire of the bolt-action Springfield.

(4) In each rifle section there are two rifle squads and one light machine-gun squad. All squads consist of a corporal and six men. The light machine gun is an automatic weapon. For the present, the modernized Browning automatic rifle (bipod rest) is to be used until a suitable light machine gun has been developed. (See page 29.)

(5) The proposed new regiment contains an antitank (caliber 0.50 machine-gun) company, which has a secondary antiaircraft mission. (See page 33.)

(6) Instead of a howitzer company with three 37-mm guns and three mortars, the new regiment has a mortar company with 6 mortars only.

OTHER INTERESTING CHANGES

The new rifle battalions have headquarters detachments instead of headquarters companies. They are smaller and contain no intelligence platoon. A group consisting of four observers (a corporal and 3 privates) is substituted. The communications platoon of this detachment contains no wire section and no radio and panel section.

The new regiment contains about 500 less enlisted men than the old. There are almost as many officers, however. All companies have fewer men except the mortar company, which is one man larger than the old howitzer company.

The new service company is commanded by a major.

Rifle company headquarters are about half as large in the new regiment as in the old.

The new regiment contains fewer non-commissioned officers of all grades roughly in proportion to its smaller size, except sergeants. It has 38 more of these than the old.

Water and gasoline are carried in trucks in containers, not in tank trucks.

FIRE POWER

In spite of the facts that the proposed new regiment is smaller and has only 24 heavy (caliber 0.30 water-cooled) machine guns as compared with the 72 (including the 36 rifle company guns) of the old regiment, its fire power is slightly greater for defense and considerably greater for offense, owing chiefly to the semiautomatic rifle.

The comparative maximum battle fire power of the old and new units is indicated by the data on the next three pages. Following this is a comparison of their respective antiaircraft fire powers. The data on pages 6 and 7 omit from consideration the mortar company and the antitank company, which both constitute an increase to infantry supporting fire, since the substitution of three new mortars for three 37-mm guns makes the mortar company fire power greater than that of the old howitzer company, and the introduction of the antitank company brings much needed fire power of a special sort.

We cannot estimate with any degree of accuracy, however, what the total fire power of the new units will be until we know what type of light machine gun is finally adopted. It is to be assumed that the eventual light machine gun will be an automatic weapon comparable in fire power, for short periods at least, to the heavy Browning gun. But until such a gun is perfected and adopted, the modernized Browning automatic rifle with bipod rest is the substitute light machine gun. This weapon has somewhat less fire power than a true light machine gun; and in the data immediately following both types of weapon are shown in the comparative figures.

It is a fact, of course, that there is seldom if ever a situation, excepting possibly in antiaircraft fire, when every single weapon in an infantry regiment could blaze away at the enemy at the same moment. Nevertheless the comparative figures for the total fire power of the old and new regiments as given on page 6 are a fair indication. The assumed rates of fire are reasonable maximum usuable rates for all weapons.

A more realistic basis of comparison, perhaps, is that found on page 7. There the smaller units, omitting headquarters personnel, are directly compared. These units may often, in battle, exercise their total fire power at a given time.

The antiaircraft capabilities of the old and new units (pages 8 and 9) show a tremendous increase for the new. Here, for the sake of comparison, it is assumed that every weapon fires at maximum speed for a period of five seconds. (This would be approached in firing against an aerial attack in flat, open terrain.)

COMPARISON OF FIRE POWER OF THE OLD AND NEW REGIMENTS

ASSUMED RATES OF FIRE

Weapon	*Rounds per Minute*
Springfield Rifle (R)	12
Semiautomatic rifle (SAR)	24
Browning Automatic Rifle (BAR)	60
Light machine gun (LMG)	200*a*
Heavy machine gun (0.30 MG)	250

TOTAL FIRE PER MINUTE

OLD REGIMENT

Weapon	*No.*	*Rate*	*Total*
R	1646	12	19,752
BAR	162	60	9,720
0.30MG.	36*b*	250	9,000
TOTAL			38,502

NEW REGIMENT

Weapon	*No.*	*Rate*	*Total*
SAR	1435	24	34,440
LMG	108	200	21,600
0.30MG	24	250	6,000
TOTAL			52,040

a. This rate of fire is assumed as a reasonable maximum usable rate for a light, automatic fire machine gun. The modernized Browning automatic rifle, which is to be used in place of a new type light machine gun temporarily, is probably not capable of sustained fire at 200 rounds per minute; 100 rounds per minute is a more reasonable estimate. The new regiment, equipped with this weapon, would have a total (combat unit) fire power of 41,240 rounds per minute.

b. If we include here the 36 additional rifle company machine guns (mainly employed in defense), the total fire power for the old regiment is 45,744 rounds per minute.

COMPARISON OF FIRE POWER OF THE NEW RIFLE BATTALION AND ITS COMBAT ELEMENTS WITH CORRESPONDING UNITS OF THE OLD REGIMENTS

THE RIFLE COMPANIES OF THE OLD BATTALION[a]				THE NEW RIFLE BATTALION			
Weapon	*No.*	*Rate*	*Total*	*Weapon*	*No.*	*Rate*	*Total*
R	450	12	5,400	SAR	342	24	8,208
BAR	54	60	3,240	LMG	36	200	7,200
	TOTAL		8,640		TOTAL		15,408[b]

a. Less all headquarters personnel of the battalion and companies.
b. With the modernized Browning automatic rifle, assuming a maximum usable rate of fire of 100 rounds per minute, the total fire power would be 3,600 rounds less, or 11,808 per min.

COMPONENTS OF THE BATTALION

The same ratios as above hold in the rifle company, platoon, and section, as shown below:

Unit	OLD *Total Fire Power*	NEW *Total Fire Power With LMG*	NEW *Total Fire Power With Modernized BAR*
Company	2880	5136	3936
Platoon	960	1712	1312
Section	456	808	608

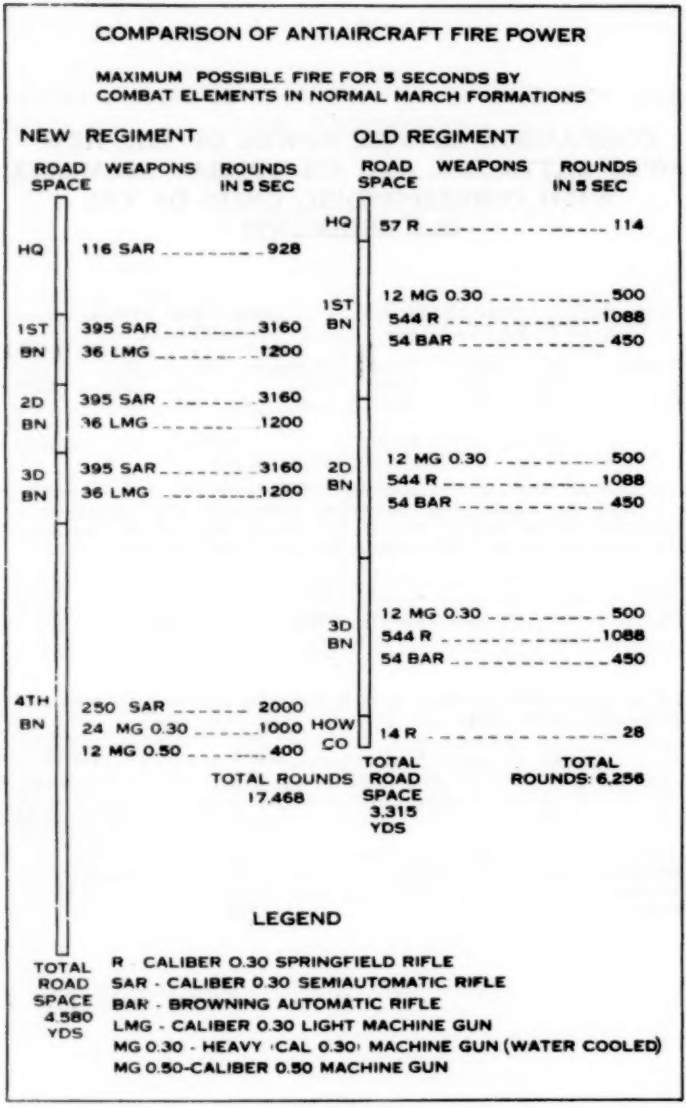
COMPARISON OF ANTIAIRCRAFT FIRE POWER
MAXIMUM POSSIBLE FIRE FOR 5 SECONDS BY COMBAT ELEMENTS IN NORMAL MARCH FORMATIONS
NEW REGIMENT
ROAD SPACE
WEAPONS
ROUNDS IN 5 SEC
HQ
116 SAR 928
1ST BN
395 SAR 3160
36 LMG 1200
2D BN
395 SAR 3160
36 LMG 1200
3D BN
395 SAR 3160
36 LMG 1200
4TH BN
250 SAR 2000
24 MG 0.30 1000
12 MG 0.50 400
TOTAL ROUNDS 17,468
TOTAL ROAD SPACE 4,580 YDS
OLD REGIMENT
ROAD SPACE
WEAPONS
ROUNDS IN 5 SEC
HQ
57 R 114
1ST BN
12 MG 0.30 500
544 R 1088
54 BAR 450
2D BN
12 MG 0.30 500
544 R 1088
54 BAR 450
3D BN
12 MG 0.30 500
544 R 1088
54 BAR 450
HOW CO
14 R 28
TOTAL ROAD SPACE 3,315 YDS
TOTAL ROUNDS: 6,256
LEGEND
R - CALIBER 0.30 SPRINGFIELD RIFLE
SAR - CALIBER 0.30 SEMIAUTOMATIC RIFLE
BAR - BROWNING AUTOMATIC RIFLE
LMG - CALIBER 0.30 LIGHT MACHINE GUN
MG 0.30 - HEAVY (CAL 0.30) MACHINE GUN (WATER COOLED)
MG 0.50-CALIBER 0.50 MACHINE GUN

FIGURE 1.

MAXIMUM ANTIAIRCRAFT FIRE PER YARD OF ROAD SPACE

Unit	*Road Space*	*Maximum AA Fire Per Sec.*	*Maximum Per Yard Of Road Space*	*Ratio Of New Unit To Old*
	(*yards*)	(*rounds*)	(*rounds*)	
Old Bn	920	408	0.44	
New Rif. Bn	450	872	1.93	4.4 times old
New SW Bn	2235	680	0.30	
Old Regt	3315	1251	0.38	
New Regt	4580	3482	0.76	2.0 times old

MAXIMUM ANTIAIRCRAFT RATES OF FIRE

Weapon	*Rounds per min.*	
R	20	
SAR	100	(for one clip of 8)
BAR	100	(semiautomatic fire)
LMG	400	
MG 0.30	500	(450-600)
MG 0.50	400	

ROAD SPACES

On the next few pages are shown graphically the road spaces occupied by the elements of the old and new units. The combat elements are shown separately from the field trains. These, which are completely motorized, it is assumed will move separately far more often than not.

The most noteworthy fact, perhaps, is the comparatively small amount of road space occupied by foot troops in the new regiment. These foot elements with their individual packs and equipment could be transported by 109, 1½-ton trucks; 55, 2½-ton trucks; or 41, 40-passenger busses.

In considering motorized unit road spaces, it should be especially noted that a basis of roughly 30 yards per vehicle has been used. Actually, road spaces of such units are greatly variable. The space of 30 yards is inadequate at speeds of much over 15 miles an hour. At 30 to 40 miles an hour, which may often be practicable, 60 to 100 yards per vehicle is desirable. Moreover, for antiaircraft protection 150 to 250 yards per vehicle may be desirable, particularly for trains not equipped for an energetic, active defense against air attacks.

It is also important to note that the chief factor in considering the movement of large motorized units on roads is often not the road "space" but the road "time". For example: If the new regiment were completely motorized by using busses for the non-motorized troops, it would occupy, assuming 100 yards per vehicle, about 13.4 miles of road. But if it moved 30 miles an hour, it would pass a given point in 26.8 minutes (nearly a day's march for a column of foot troops of the same length.) It would clear a 10-mile stretch of road in 46.8 minutes at that speed; and a 50-mile stretch in 2 hours, 6.8 minutes. (This matter was covered in some detail in Chapter IV, Volume VIII of the Mailing List.)

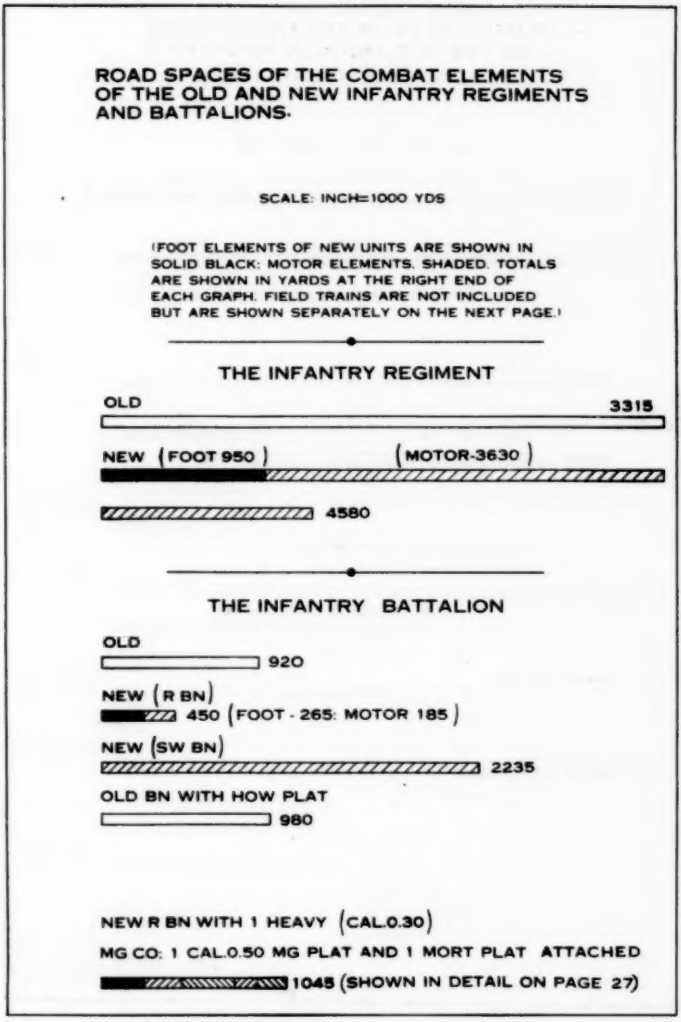
ROAD SPACES OF THE COMBAT ELEMENTS OF THE OLD AND NEW INFANTRY REGIMENTS AND BATTALIONS.
SCALE: INCH=1000 YDS
(FOOT ELEMENTS OF NEW UNITS ARE SHOWN IN SOLID BLACK: MOTOR ELEMENTS. SHADED. TOTALS ARE SHOWN IN YARDS AT THE RIGHT END OF EACH GRAPH. FIELD TRAINS ARE NOT INCLUDED BUT ARE SHOWN SEPARATELY ON THE NEXT PAGE.)
THE INFANTRY REGIMENT
OLD
3315
NEW (FOOT 950) (MOTOR-3630)
4580
THE INFANTRY BATTALION
OLD
920
NEW (R BN)
450 (FOOT - 265: MOTOR 185)
NEW (SW BN)
2235
OLD BN WITH HOW PLAT
980
NEW R BN WITH 1 HEAVY (CAL.0.30)
MG CO: 1 CAL.0.50 MG PLAT AND 1 MORT PLAT ATTACHED
1045 (SHOWN IN DETAIL ON PAGE 27)

FIGURE 2.

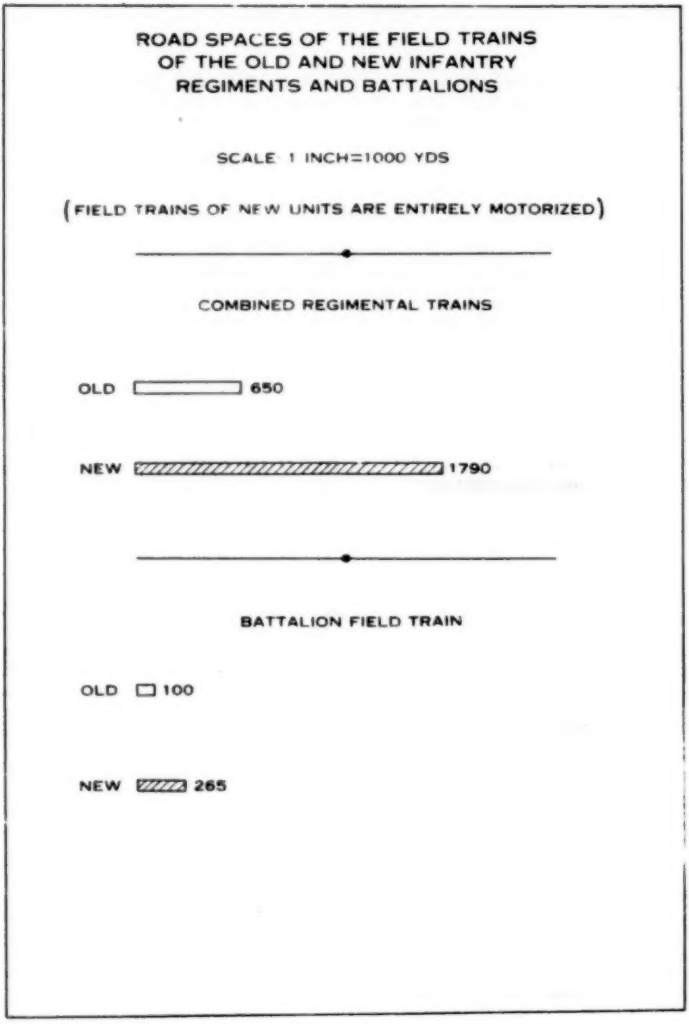
ROAD SPACES OF THE FIELD TRAINS
OF THE OLD AND NEW INFANTRY
REGIMENTS AND BATTALIONS
SCALE 1 INCH=1000 YDS
(FIELD TRAINS OF NEW UNITS ARE ENTIRELY MOTORIZED)
COMBINED REGIMENTAL TRAINS
OLD 650
NEW 1790
BATTALION FIELD TRAIN
OLD 100
NEW 265

FIGURE 3.

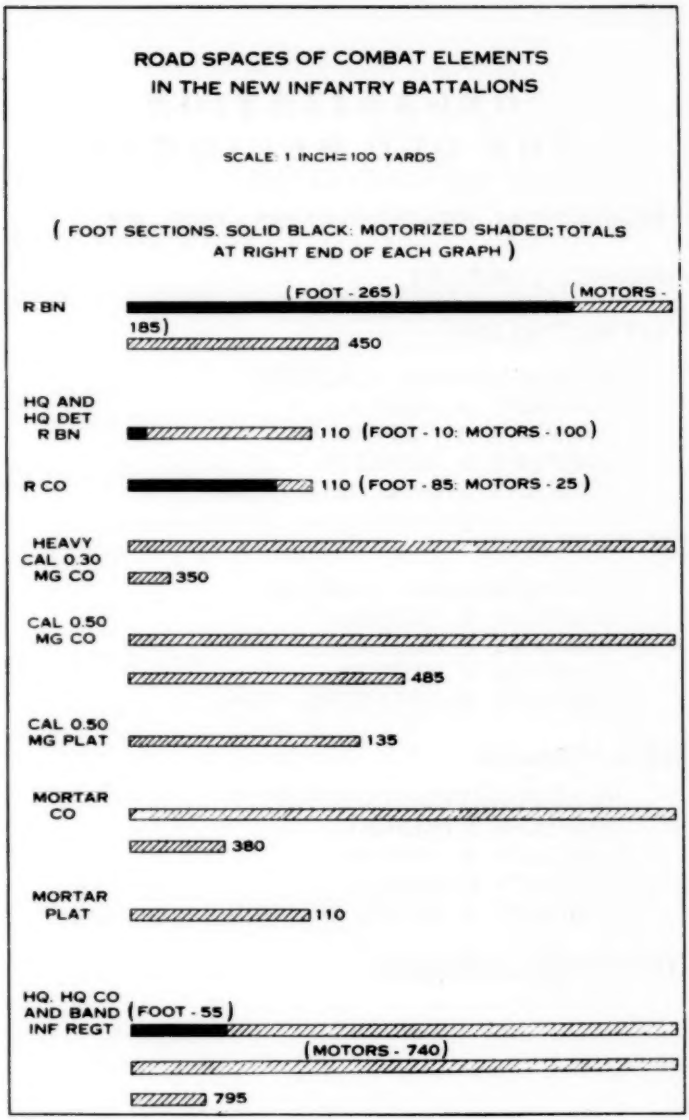
ROAD SPACES OF COMBAT ELEMENTS
IN THE NEW INFANTRY BATTALIONS
SCALE: 1 INCH=100 YARDS
(FOOT SECTIONS. SOLID BLACK: MOTORIZED SHADED; TOTALS AT RIGHT END OF EACH GRAPH)
R BN
(FOOT - 265)
(MOTORS - 185)
450
HQ AND HQ DET R BN
110 (FOOT - 10: MOTORS - 100)
R CO
110 (FOOT - 85: MOTORS - 25)
HEAVY CAL 0.30 MG CO
350
CAL 0.50 MG CO
485
CAL 0.50 MG PLAT
135
MORTAR CO
380
MORTAR PLAT
110
HQ. HQ CO AND BAND INF REGT
(FOOT - 55)
(MOTORS - 740)
795

FIGURE 4.

ORGANIZATION
THE OLD REGIMENT

REGIMENTAL HEADQUARTERS COMPANY

SERVICE COMPANY

1ST BATTALION

HEADQUARTERS COMPANY
COMPANY A (RIFLE)
COMPANY B (RIFLE)
COMPANY C (RIFLE)
COMPANY D (MACHINE GUN)

2D BATTALION

HEADQUARTERS COMPANY
COMPANY E (RIFLE)
COMPANY F (RIFLE)
COMPANY G (RIFLE)
COMPANY H (MACHINE GUN)

3D BATTALION

HEADQUARTERS COMPANY
COMPANY I (RIFLE)
COMPANY K (RIFLE)
COMPANY L (RIFLE)
COMPANY M (MACHINE GUN)

HOWITZER COMPANY

ORGANIZATION
THE NEW REGIMENT

REGIMENTAL HEADQUARTERS COMPANY

SERVICE COMPANY

1ST BATTALION

HEADQUARTERS DETACHMENT
COMPANY A (RIFLE)
COMPANY B (RIFLE)
COMPANY C (RIFLE)

2D BATTALION

HEADQUARTERS DETACHMENT
COMPANY D (RIFLE)
COMPANY E (RIFLE)
COMPANY F (RIFLE)

3D BATTALION

HEADQUARTERS DETACHMENT
COMPANY G (RIFLE)
COMPANY H (RIFLE)
COMPANY I (RIFLE)

4TH BATTALION

HEADQUARTERS DETACHMENT
COMPANY K (HEAVY MACHINE GUN)
COMPANY L (HEAVY MACHINE GUN)
COMPANY M (HEAVY MACHINE GUN)

ANTITANK COMPANY (CALIBER 0.50 MACHINE-GUN COMPANY)

MORTAR COMPANY

MAIN DATA
THE OLD REGIMENT

COMPANIES	18
ENLISTED MEN	2,985
OFFICERS	120
WARRANT OFFICERS	1
AGGREGATE	3,105
ANIMALS	492
ANIMAL-DRAWN VEHICLES	148
MOTORS	11
MOTORCYCLES	6

WEAPONS

RIFLES, CALIBER 0.30, BOLT-ACTION	1,852
AUTOMATIC RIFLES, CALIBER 0.30	162
MACHINE GUNS, CALIBER 0.30	36 (72)*a*
GUNS, 37-MM	3
MORTARS, INFANTRY	3
PISTOLS	995
GRENADE DISCHARGERS	162

a. Figures in parentheses include 36 rifle company machine guns.

MAIN DATA
THE NEW REGIMENT

COMPANIES	16
ENLISTED MEN	2,454
OFFICERS	113
WARRANT OFFICERS	1
AGGREGATE	2,568
ANIMALS	NONE
MOTORS	173
MOTORCYCLES	22

WEAPONS

RIFLES, CALIBER 0.30, SEMI-AUTOMATIC	1,686
LIGHT MACHINE GUN, 0.30 (FOR THE PRESENT THE MODERNIZED AUTOMATIC RIFLE)	108
HEAVY MACHINE GUNS, (CALIBER 0.30)	24
ANTITANK MACHINE GUNS, (CALIBER 0.50)	12
GUNS, 37-MM	NONE
MORTARS, 81-MM	6
PISTOLS	774

TRANSPORTATION
THE OLD REGIMENT

ANIMALS
- HORSES 141
- MULES 351
- AGGREGATE 492

CARTS (MG, 37-MM, COMM., AMM, AND MORTAR) 86

WAGONS (COMBAT, R and B, ESCORT) 44

KITCHENS, ROLLING, 4-MULE 18

MOTORCYCLES, WITH SIDE-CAR 6

TRUCKS, CARGO
- 3/4-TON 2
- 1-1/2-TON 1

CARS
- 5-PASSENGER 1
- CROSS-COUNTRY 7

TRANSPORTATION
THE NEW REGIMENT

ANIMALS	
HORSES	NONE
MULES	NONE
CARTS	NONE
WAGONS	NONE
KITCHENS, ROLLING	NONE
MOTORCYCLES,	
WITH SIDE-CAR	20
SOLO	2
TRUCKS, CARGO, 1-1/2-TON	119
(COMBAT)	(14)
(COMMUNICATION)	(7)
(MACHINE-GUN)	(40)
(MORTAR)	(9)
(BAGGAGE)	(21)
(GASOLINE IN CONTAINERS)	(3)
(WATER IN CONTAINERS)	(5)
(RATION AND KITCHEN)	(20)
TRUCKS, 1/2-TON, PICK-UP	7
TRUCKS, RECONNAISSANCE, 8-PASSENGER	23
CARS	
5-PASSENGER	2
CROSS-COUNTRY	22

GRADES
THE OLD REGIMENT

COMMISSIONED

COLONELS	1
LIEUTENANT COLONELS	4
MAJORS	5
CAPTAINS	25
FIRST LIEUTENANTS	57
SECOND LIEUTENANTS	28

WARRANT OFFICERS	1

NON-COMMISSIONED

MASTER SERGEANTS	6
(TECHNICAL SERGEANTS	14
(FIRST SERGEANTS	15
STAFF SERGEANTS	26
SERGEANTS	196
CORPORALS	363
(PRIVATES, FIRST CLASS	748
(PRIVATES	1617
SPECIALISTS, 2D	(2)
SPECIALISTS, 3D	(7)
SPECIALISTS, 4TH	(83)
SPECIALISTS, 5TH	(98)
SPECIALISTS, 6TH	(346)

GRADES
THE NEW REGIMENT

COMMISSIONED	
COLONELS	1
LIEUTENANT COLONELS	5
MAJORS	6
CAPTAINS	18
FIRST LIEUTENANTS	50
SECOND LIEUTENANTS	33
WARRANT OFFICERS	1
NON-COMMISSIONED	
MASTER SERGEANTS	5
(TECHNICAL SERGEANTS	12
(FIRST SERGEANTS	16
STAFF SERGEANTS	19
SERGEANTS	234
CORPORALS	306
PRIVATES, FIRST CLASS	640
PRIVATES	1,222
SPECIALISTS, 3D	(9)
SPECIALISTS, 4TH	(82)
SPECIALISTS, 5TH	(52)
SPECIALISTS, 6TH	(379)

(In order to have a better basis for comparison, the old battalion with one howitzer platoon attached is shown opposite the new rifle battalion with certain attachments, on pages 26 and 27.)

MAIN DATA
THE NEW RIFLE BATTALION

COMPANIES	3
OFFICERS	19
ENLISTED MEN	508
ANIMALS	NONE
ANIMAL-DRAWN VEHICLES	NONE
MOTORS	2*a*
MOTORCYCLES	1
WEAPONS	
RIFLES, CALIBER 0.30, SEMI-AUTOMATIC	395
LIGHT MACHINE GUNS, CALIBER 0.30 (FOR THE PRESENT, THE MODERNIZED AUTOMATIC RIFLE)	36
HEAVY MACHINE GUNS, (CALIBER 0.30)	NONE
PISTOLS	96

a 1 car, cross-country; and 1 truck, reconnaissance, 8-passenger, for headquarters detachment.

(Although the old regiment had no special weapons battalion constituted as such, it has often proven desirable for administrative purposes, even in peace-strength regiments, to combine certain companies in a "special units" battalion. For some time the special units battalion of the 29th Infantry, a war-strength (two-battalion) regiment has consisted of: Regimental Headquarters Company, the Service Company, Howitzer Company, and Regimental Machine Gun Company. Such combinations, however, were purely administrative, and should not be taken as parallels to the new Special Weapons Battalion shown on the opposite page, which has important tactical aspects.)

MAIN DATA
THE NEW SPECIAL WEAPONS BATTALION

COMPANIES	5
ENLISTED MEN	593
OFFICERS	33
ANIMALS	NONE
ANIMAL-DRAWN VEHICLES	NONE
MOTORS	73
MOTORCYCLES	2
WEAPONS	
RIFLES, CALIBER 0.30, SEMI-AUTOMATIC	250
HEAVY MACHINE-GUNS, (CALIBER 0.30)	24
ANTITANK MACHINE-GUNS, (CALIBER 0.50)	12
MORTARS, 81-MM	6
PISTOLS	376

MAILING LIST——3.

MAIN DATA
THE OLD BATTALION, WITH HOWITZER PLATOON

	BN.	HOW. PLAT.	TOTAL
ENLISTED MEN	824	29	853
OFFICERS	28	1	29
ANIMALS	54	5	59*a*
ANIMAL-DRAWN VEHICLES	25	3	28
MOTORS	1	0	1
WEAPONS			
RIFLES, CALIBER 0.30, BOLT-ACTION	544	2	546
AUTOMATIC RIFLES, CALIBER 0.30	54	0	54
MACHINE GUNS, CALIBER 0.30	12(24)*b*	0	12(24)*b*
GUNS, 37-MM		1	1
MORTARS, INFANTRY		1	1
PISTOLS	254	28	282

a Field trains not included.
b Figures in parentheses include rifle company machine guns (4 per company).

MAIN DATA

THE NEW RIFLE BATTALION, WITH ONE HEAVY (CALIBER 0.30) MACHINE-GUN COMPANY, ONE ANTITANK (CALIBER 0.50 MACHINE-GUN) PLATOON, AND ONE MORTAR PLATOON*a*

	RIFLE BN.	MG CO. CAL. 0.30	MG PLAT CAL. 0.50	MORT PLAT	TOTAL
ENLISTED MEN	508	105	41	29	683
OFFICERS	19	5	1	1	26
ANIMALS AND ANIMAL-DRAWN VEHICLES					NONE
MOTORS	2	13	5	4	24*b*
WEAPONS					
RIFLES, CALIBER 0.30, SEMI-AUTOMATIC	395	42	11	10	458
LIGHT MACHINE GUNS, CALIBER 0.30, THE MODERNIZED AUTOMATIC RIFLE	36				36
HEAVY MACHINE GUNS, (CALIBER 0.30)		8			8
ANTITANK MACHINE GUNS, (CALIBER 0.50)			4		4
MORTARS, 81-MM				2	2
PISTOLS	96	68	31	20	215

a These are not to be taken as standard attachments.
b Field trains not included.

ORGANIZATION
THE OLD RIFLE COMPANY

	OFF	E.M.
THE OLD RIFLE COMPANY	5	193
COMPANY HEADQUARTERS	(2)	(22)
3 PLATOONS	(3)	(171)
THE OLD RIFLE PLATOON	1	57
PLATOON HEADQUARTERS	(1)	(5)
2 SECTIONS		(52)
THE OLD RIFLE SECTION		26
SECTION HEADQUARTERS		(2)
3 SQUADS		(24)
THE OLD RIFLE SQUAD		8

1 CORPORAL SQUAD LEADER (RIFLEMAN)

6 RIFLEMEN

1 AUTOMATIC RIFLEMAN

ORGANIZATION
THE NEW RIFLE COMPANY

	OFF.	EM
THE NEW RIFLE COMPANY	5	162
COMPANY HEADQUARTERS	(2)	(12)
3 PLATOONS	(3)	(150)
THE NEW RIFLE PLATOON	1	50
PLATOON HEADQUARTERS	(1)	(4)
2 SECTIONS		(46)
THE NEW RIFLE SECTION		23
SECTION HEADQUARTERS		(2)
2 RIFLE SQUADS		(14)
1 LIGHT MACHINE-GUN SQUAD		(7)

THE NEW RIFLE SQUAD

1 CORPORAL, SQUAD LEADER (RIFLEMAN)

6 RIFLEMEN

THE NEW LIGHT MACHINE-GUN SQUAD

1 CORPORAL, SQUAD LEADER (carries a rifle)

2 GUNNERS (carry light machine guns and pistols)

4 AMMUNITION CARRIERS (carry pistols)

ORGANIZATION
OLD MACHINE-GUN COMPANY

	OFF.	EM	AN
OLD MACHINE-GUN COMPANY....	6	182	37
COMPANY HEADQUARTERS	(3)	(23)	(7)
3 PLATOONS	(3)	(159)	(30)
OLD MACHINE-GUN PLATOON....	1	53	10
PLATOON HEADQUARTERS	(1)	(7)	(2)
2 SECTIONS		(46)	(8)
OLD MACHINE-GUN SECTION....		23	4
SECTION HEADQUARTERS....		(1)	
2 SQUADS		(22)	(4)

OLD MACHINE-GUN SQUAD

1 CORPORAL SQUAD LEADER
1 GUNNER
1 ASSISTANT GUNNER
1 MEMBER GUN CREW
5 AMMUNITION CARRIERS
2 MULE LEADERS

The company contained:
162 pistols
26 rifles.

ORGANIZATION
NEW HEAVY MACHINE-GUN COMPANY (CALIBER 0.30)

	OFF.	EM	MOTORS
NEW HEAVY MACHINE-GUN COMPANY	5	105	13
COMPANY HEADQUARTERS	(3)	(23)	(3)*a*
2 PLATOONS	(2)	(82)	(10)
NEW HEAVY MACHINE-GUN PLATOON	1	41	5
PLATOON HEADQUARTERS	(1)	(7)	(1)*b*
2 SECTIONS		(34)	(4)*c*
NEW HEAVY MACHINE-GUN SECTION		17	2
SECTION HEADQUARTERS	(1).		
2 SQUADS	(16).		(2)

NEW HEAVY MACHINE-GUN SQUAD

1 CORPORAL SQUAD LEADER (carries a pistol)
1 CHAUFFEUR (carries a rifle)
1 MACHINE GUNNER (carries a pistol)
1 ASSISTANT MACHINE GUNNER (carries a pistol)
4 AMMUNITION (OR WATER) CARRIERS (carry pistols)

a 2 cars, cross-country; and 1 truck, cargo, 1½-ton (machine-gun)
b 1 truck, reconnaissance, 8-passenger;
c 4 trucks, cargo, 1½-ton, (machine-gun).

(The company contains: 68 pistols; 42 SAR.)

(The old infantry regiment contained no antitank company, although for several years a unit much like the new caliber 0.50 company shown opposite has been assumed for instructional purposes at The Infantry School.)

ORGANIZATION

ANTITANK (CALIBER 0.50 MACHINE-GUN) COMPANY

	OFF.	EM	MOT
ANTITANK COMPANY	6	146	18
COMPANY HEADQUARTERS	(3)	(23)	(3)*a*
3 PLATOONS	(3)	(123)	(15)
ANTITANK PLATOON	1	41	5
PLATOON HEADQUARTERS	(1)	(7)	(1)*b*
2 SECTIONS		(34)	(4)*c*
ANTITANK SECTION		17	2
SECTION HEADQUARTERS		(1)	
2 SQUADS		(16)	(2)

ANTITANK SQUAD

1 CORPORAL
1 CHAUFFEUR
1 MACHINE GUNNER
1 ASSISTANT MACHINE GUNNER
4 AMMUNITION (OR WATER) CARRIERS

a 2 cars, cross-country—and 1 truck, cargo, 1½-ton (machine gun)
b 1 truck, reconnaissance, 8-passenger;
c 4 trucks, cargo, 1½-ton, (machine-gun)

The company contains:

98 pistols
54 SAR

ORGANIZATION
THE OLD HOWITZER COMPANY

	OFF	EM
THE OLD HOWITZER COMPANY	6	107
COMPANY HEADQUARTERS	(3)	(20)
3 PLATOONS	(3)	(87)
THE OLD HOWITZER PLATOON	1	29
PLATOON HEADQUARTERS	(1)	(6)
GUN SQUAD		(8)
MORTAR SQUAD		(7)
AMMUNITION SQUAD		(8)

The old Howitzer Company contained:

23 animals
1 car, cross-country
9 animal-drawn vehicles
3 guns, 37-mm
3 mortars, infantry
99 pistols
14 rifles.

ORGANIZATION
THE NEW MORTAR COMPANY

	OFF.	EM	MOT
THE NEW MORTAR COMPANY	**6**	**108**	**14**
COMPANY HEADQUARTERS	**(3)**	**(21)**	**(2)***a*
3 PLATOONS	**(3)**	**(87)**	**(12)**
THE NEW MORTAR PLATOON	**1**	**29**	**4**
PLATOON HEADQUARTERS	**(1)**	**(7)**	**(1)***b*
1 MORTAR SECTION	**(15)**	**(2)**	
1 AMMUNITION SQUAD	**(7)**	**(1)***c*	
THE NEW MORTAR SECTION	**15**	**2**	
SECTION HEADQUARTERS	**(1)**		
2 MORTAR SQUADS	**(14)**	**(2)***d*	

The new Mortar Company contains:

6 mortars, 81-mm
65 pistols
49 rifles, semiautomatic

a 2 Trucks, reconnaissance, 8-passenger.
b 1 Truck, reconnaissance, 8-passenger.
c 1 Truck, cargo, 1½-ton (mortar).
d 2 Trucks, cargo, 1½-ton (mortar).

ORGANIZATION
THE OLD HEADQUARTERS COMPANY
THE INFANTRY REGIMENT

	OFF	EM
THE OLD HEADQUARTERS COMPANY ..	13	107
REGIMENTAL HEADQUARTERS	(8)	
COMPANY HEADQUARTERS	(1)	(24)
INTELLIGENCE PLATOON		(14)
PIONEER PLATOON	(1)	(33)
COMMUNICATION PLATOON	(1)	(36)
THE OLD COMMUNICATION PLATOON ..	1	36
PLATOON HEADQUARTERS	(1)	(2)
MESSAGE CENTER SECTION		(11)
WIRE SECTION		(12)
RADIO AND VISUAL SECTION		(11)

The old Headquarters Company,
The Infantry Regiment, contained:

- 24 animals
- 2 animal-drawn carts
- 2 cars, cross-country
- 1 car, 5-passenger
- 2 motorcycles, with side-car
- 1 truck, cargo, 1½-ton
- 61 pistols
- 57 rifles.

ORGANIZATION
THE NEW HEADQUARTERS COMPANY, INFANTRY REGIMENT

	OFF	EM	MOT
THE NEW HEADQUARTERS COMPANY	13	156	29*a*
REGIMENTAL HEADQUARTERS	(5)		
COMPANY HEADQUARTERS	(2)	(23)	(4)*b*
COMMUNICATIONS PLATOON	(5)	(116)	(17)
RECONNAISSANCE AND INTELLIGENCE PLATOON	(1)	(17)	(8)
THE NEW COMMUNICATIONS PLATOON	5	116	17
PLATOON HEADQUARTERS	(1)	(6)	(3)*c*
MESSAGE CENTER		(15)	(4)*d*
REGIMENTAL SECTION		(20)	
3 RIFLE BATTALION SECTIONS	(3)	(54)	(3)
1 SPECIAL WEAPONS BATTALION SECTION	(1)	(21)	(7)
THE RIFLE BATTALION SECTION	1	18	1*e*
SECTION HEADQUARTERS			
1 WIRE SECTION			
1 RADIO AND VISUAL SECTION			
THE SPECIAL WEAPONS BATTALION SECTION	1	21	7*f*
SECTION HEADQUARTERS			
1 WIRE SECTION			
1 RADIO AND VISUAL SECTION			
THE NEW RECONNAISSANCE AND INTELLIGENCE PLATOON	1	17	8*g*

a Including 10 motorcycles.
b 1 car, cross-country; 1 car, 5 passenger; 1 truck, cargo, 1½-ton; 1 truck, reconnaissance, 8-passenger.
c 1 car, cross-country; 2 trucks, cargo, 1½-ton, carrying communications equipment.
d 3 motorcycles with side-car; 1 motorcycle, solo.
e 1 truck, cargo, 1½-ton, carrying communications equipment.
f 1 car, cross-country; 1 motorcycle, with side-car; 1 motorcycle, solo; 1 truck, cargo, 1½-ton, carrying communications equipment; 3 trucks, reconnaissance, 8-passenger.
g 4 cars, cross-country, equipped with voice radio; 4 motorcycles, with side-car, equipped with rifle boot.

The company contains:
53 pistols
116 rifles.

ORGANIZATION
THE OLD SERVICE COMPANY

	OFF	EM
THE OLD SERVICE COMPANY	6	187
COMPANY HEADQUARTERS	(1)	(13)
HEADQUARTERS PLATOON	(4)	(37)
TRANSPORTATION PLATOON	(1)	(137)
HEADQUARTERS PLATOON	4	37
STAFF SECTION	(1)	(16)
SUPPLY SECTION	(3)	(21)
TRANSPORTATION PLATOON	1	137
HEADQUARTERS SECTION		(7)
HOWITZER SECTION		(9)
PLATOON HEADQUARTERS	(1)	(28)
3 BATTALION SECTIONS		(93)

The old Service Company contained:

250 animals
1 car, cross-country
57 animal-drawn vehicles
2 trucks, cargo, 1½-ton
44 pistols
149 rifles.

ORGANIZATION
THE NEW SERVICE COMPANY

	OFF	EM	MOT
THE NEW SERVICE COMPANY	10	153	82
COMPANY HEADQUARTERS	(3)*g*	(38)	(14)*a*
HEADQUARTERS PLATOON	(3)	(36)	(6)
3 RIFLE BATTALION PLATOONS	(3)	(54)	(42)
1 SPECIAL WEAPONS BATTALION PLATOON	(1)	(19)	(15)
HEADQUARTERS COMPANY PLATOON	(6)	(5)	
HEADQUARTERS PLATOON	3	36	6
STAFF SECTION	(1)	(17)	(2)*b*
SUPPLY SECTION	(2)	(19)	(4)*c*
RIFLE BATTALION PLATOON	1	18	14*d*
SPECIAL WEAPONS BATTALION PLATOON	1	19	15*e*
HEADQUARTERS COMPANY PLATOON	6		5*f*

a 1 car, cross-country; 5-passenger; 8 trucks, cargo, 1½-ton (3 baggage, 1 ration and kitchen, 1 water, 3 gasoline in containers); 1 motorcycle, with side-car; 2 trucks, ½-ton, pick-up; 1 truck, reconnaissance, 8-passenger.
b 1 motorcycle, with side-car; 1 truck, cargo, 1½-ton (baggage).
c 2 cars, cross-country; 1 motorcycle, with side-car; 1 truck, cargo, 1½-ton (baggage).
d 1 motorcycle, with side-car; 12 trucks, cargo, 1½-ton (3 baggage, 4 combat, 4 ration and kitchen, 1 water); 1 truck, ½-ton, pick-up.
e 1 motorcycle, with side-car; 13 trucks, cargo, 1½-ton, (5 baggage, 1 combat, 6 ration and kitchen, 1 water); 1 truck, ½-ton, pick-up.
f 4 trucks, cargo, 1½-ton (2 baggage, 1 combat, 1 ration and kitchen); 1 truck ½-ton, pick-up.
g The company is commanded by a major.

The company contains:
28 pistols
135 SAR.

CHAPTER 2

Tactical Aspects of the Proposed New Regiment

"The small units of the front lines—certainly to include the battalion of infantry—must abandon the attempt to include within themselves every type of tactical power of which they may have occasional need. Emergency and special fires must be furnished by supporting troops separately organized so that the front-line unit and its commander may concentrate upon one objective and one type of problem, and carry their own tasks swiftly to completion. Each portion of the whole command must trust every other portion to perform its missions properly and promptly. Our tactical organization must be developed on this concept."

—Report of the Chief of Staff U. S. Army, 1935.

From the viewpoint of tactics, two important differences in the proposed new infantry regiment form the main basis of change in the conduct of both the attack and the defense. These are the introduction of the light machine gun in each rifle section, and the concentration of all heavy machine guns, mortars, and antitank guns in a fourth battalion.

The ways these two changes are likely to affect offensive and defensive combat are briefly outlined below. Naturally, time, experience, and study will eventually bring further modification and change.

OFFENSIVE COMBAT

THE NEW INFANTRY REGIMENT

The regiment is a more important echelon of command than before.

Means of communication are more centered in the regiment than before.

All heavy supporting weapons—the heavy (caliber 0.30 machine gun), the 81-mm mortar, the antitank (caliber 0.50 machine gun) are regimental supporting weapons in a regimental unit.

Regimental supporting fires can be massed with greater facility.

Every weapon in the special weapons battalion can be used to support a single rifle battalion when necessary.

These fires may later be switched, still concentrated, if it is desirable, to support another rifle battalion. This contributes to the attack advance by shouldering forward first one assault rifle battalion and then the other (with the third in reserve); or enables the regimental commander to put his whole supporting power behind a single rifle battalion when only one is in assault.

Rifle battalions may more readily be shifted where needed, frequently operating under a regimental command other than their parent units.

In other words, brigade and division commanders continue to think, plan, and conduct the attack, in terms of rifle battalions as before.

When a rifle battalion operates under another command than that of its parent regiment, it depends on the unit with which it is operating for signal communication elements and support of heavy infantry supporting weapons.

The supporting weapons of the special weapons battalion may operate controlled by regiment or, when it is necessary, attached to a rifle battalion.

THE NEW RIFLE BATTALION

All weapons are carried by hand.

It contains no combat carts or trucks.

It is only 300 yards long on the road.

It can operate more easily across country, thus leaving the roads free for the motorized units of the regiment.

Thus, the rifle battalion is more mobile and flexible, under most conditions, than the old infantry battalion.

THE NEW RIFLE COMPANY

The function and operation of the new rifle company considered as a unit are not greatly different from those of the old company, except as differences in the battalion and platoon affect the employment of the company.

THE NEW RIFLE PLATOON

The chief source of fire power is the light machine gun.

This weapon provides a base of fire equivalent to the total fire power of a considerable number of rifles.

It delivers its fire from a *point* on the battlefield—a concealed point when the ground affords one—in contrast to the irregular and more exposed line of riflemen heretofore needed to deliver the same amount of fire.

As a general rule, the light machine guns will lead the advance in the attack, possibly preceded by scouts, taking every advantage of the ground for concealment and cover.

The riflemen, at least initially, will follow these guns, also taking advantage of what cover the ground gives as they work forward but remaining close enough to the guns to receive immediately the advantage of their covering fires when these fires begin.

But where the terrain favors it, the light machine guns can be emplaced on commanding ground, with the riflemen maneuvering initially in advance of the guns and under the cover of their fires.

The light machine guns open fire on the enemy as soon as they come within effective range (usually not more than 500 yards).

They cover each other as they work forward. At least half of them should be firing, to keep the enemy constantly under fire.

THE SPECIAL WEAPONS BATTALION

THE HEAVY MACHINE-GUN COMPANIES

The heavy machine-gun companies can be used in three ways—

(1) As a three-company unit under the regimental commander.

(2) With one or more companies supporting designated rifle battalions.

(3) With one or more companies attached to designated rifle battalions.

The first method should be used whenever it is practicable because it enables the regimental commander to establish a machine-gun base of fire in support of his whole regiment and also to control more easily his supporting elements.

This method will invariably be used for the initial fire support of an attack, when the ground has suitable positions for the guns and there are enemy targets for them to shoot at.

Regardless of whether the heavy machine guns support the initial advance, it may often become necessary, as the attack progresses, to employ them by either the second or third method of disposition listed above.

When this must be done, it is usually better to place one or more machine-gun companies in support of designated rifle battalions than to attach them outright.

THE MORTAR COMPANY

The mortar company can also be used in three ways—

(1) As a unit under regimental control.

(2) With one or more platoons supporting designated rifle battalions.

(3) With one or more platoons attached to designated rifle battalions.

All mortars should be held under regimental control initially; from positions well forward they place concentrations on located enemy automatic weapons.

As the attack progresses they are pushed forward, following closely the assault rifle battalions, but still operating under regiment.

The second, or even the third, method of employment listed above may eventually become desirable.

THE ANTITANK COMPANY

The antitank (caliber 0.50) machine gun is primarily a defensive weapon and will have little, if any, effective use in offensive combat, unless the enemy uses tanks in counterattack.

This company will usually stay under regimental control, although it may be desirable to allot platoons or sections to rifle battalions.

When the antitank guns can be used to good effect against targets other than tanks, the importance of their primary mission and the limitations of ammunition supply must be carefully weighed.

DEFEN VE COMBAT

THE NEW INFANTRY REGIMENT

The proposed new infantry organization does not change the basic principles of defensive combat in any way. The firepower of the defense is somewhat increased, but this only if the type of light machine gun finally adopted is comparable in firepower to the heavy machine gun. In Chapter 1 on page 6 the comparative maximum firepower of the old and new regiments is shown. With a new light machine gun, capable of rapid fire at an assumed rate of 200 rounds per minute and capable of fixed precalculated fires along lines, regardless of limitations of visibility, the new regiment would have more firepower than the old in spite of its smaller size and the reduction in number of heavy machine guns.

An important difference in the new organization as regards defensive combat results from concentrating the heavy supporting weapons in a single special weapons bat talion. The rifle battalion commander no longer has heavy machine guns organically in his organization. Thus the channels of procuring the supporting fires of these weapons are different. This matter is covered in more detail below.

The regimental defense order should prescribe the mission of the 4th Battalion and designate the areas to which it should give particular attention.

THE RIFLE BATTALION AND ITS COMPONENTS

As brought out in Chapter 1, the rifle elements of the proposed new organization have a slightly greater maximum firepower, unit for unit, than those of the old, whether or not a light machine gun comparable to the heavy gun is eventually adopted.

In planning the organization of his battalion sector, a rifle battalion commander must, as before, consider carefully the necessity for, and the coordination of, his supporting fires, obtainable in the new organization only from units of the special weapons battalion.

Units of the 4th Battalion operating in the area of a rifle battalion, and carrying out supporting missions for that battalion, are nevertheless still subject to the orders of the 4th Battalion commander. The rifle battalion and 4th Battalion commanders are engaged in executing a common mission under the orders of the regimental commander—a mission requiring the closest possible degree of cooperation. The major interest is that of the regiment, and orders from rifle battalion commanders to sup-

porting units of the 4th Battalion within their sectors should be given only in emergencies when such orders are clearly to the best interest of the regiment as a whole.

THE SPECIAL WEAPONS BATTALION AND ITS COMPONENTS

The 4th (special weapons) Battalion may operate in four ways—

(1) In support of the regiment.

(2) With component parts in support of rifle units.

(3) With component parts attached to rifle units.

(4) With part of its units in support of the regiment and others as in (2) or (3) above.

The commander of the 4th Battalion is responsible for the employment of his units and places them in accordance with the regimental commander's plan of defense.

He determines the density of heavy machine-gun defense needed in the various parts of the regimental sector, distributes the antitank elements in accordance with the general plan of the regimental commander, and determines the general location of the infantry mortars.

The 4th Battalion commander maintains control over his various units through his own communications net between battalion headquarters and the various company headquarters.

Subordinate units of the 4th Battalion tie into this communications net by runner to the nearest company headquarters.

Liaison officers from the 4th Battalion (There are two of them in the proposed tables of organization.) are located at the command posts of the front-line rifle battalions. They keep the 4th Battalion commander in close touch with the situation in their respective rifle battalion areas.

Whenever practicable, the 4th Battalion commander accompanies the regimental commander on his reconnaissance of the defensive position.

THE HEAVY MACHINE COMPANIES

The primary mission of the heavy machine guns is in general the same as before. They protect those parts of the defensive position whose retention is vital to the defense (keypoints).

Assuming the adoption of a light machine gun capable of considerable sustained firepower, the heavy machine guns will not be absorbed into local or company missions but will, in the general case, be kept on more appropriate missions of vital interest to the battalion they are supporting, or to the regiment.

THE MORTAR COMPANY

The mortar company will usually operate in support of regiment.

Because of their high angle of fire, it is not likely that their location will require as close coordination with the rifle elements as those of the heavy machine guns.

Regimental sectors will ordinarily be too wide for all three mortar platoons to be located together.

THE ANTITANK COMPANY

This unit will operate normally in support of the regiment.

The weapons (caliber 0.50 machine guns) will be distributed in width and depth to cover the most likely avenues of approach for the enemy's tanks.

They will normally be placed singly and will depend for protection upon concealment and the general organization of the defensive area.

They will, however, be sited so as to be mutually supporting.

CHAPTER 3

Stopping a Panic

"If your officer's dead and the sergeants look white,
Remember it's ruin to run from a fight:
So take open order, lie down and sit tight
And wait for supports like a soldier."

—*Kipling.*

Panic is the dread of all commanders, but not enough has been written about it. The scanty data we have is incomplete, for the observer generally emphasizes the chaos and confusion that occurred during a panic and praises the one or two units which in some cases have not succumbed to the dread mental infection. He is enthralled by the drama; hence little is observed, remembered, or recorded about the method, or methods, that a skilled commander has used to prevent his unit disintegrating. Volume VIII of the Mailing List gives a number of historical examples of panics and endeavors to analyze them in a scientific manner. But little is known of the technique of arresting a panic once it is started. It is generally thought that once it starts, a panic, like a physical fever, must run its course.

For this reason the letter written by Major G. V. Gurney, M. C., Canadian Reserve of Officers, to Lieutenant E. M. Starr, 26th Infantry is of great interest. Major Gurney, at the time of the incident related, was a lieutenant in the 1st Canadian Infantry Battalion. An extract of the letter is published here with Lieutenant Starr's permission.

Dear Ted:

I have just returned from a reunion of the "Old Originals" at Windsor, Ontario. It was the first reunion I have attended since the War and was the 20th Anniversary of the first poison gas attack at Ypres. The survivors are very few. And you can imagine my feelings, after all these years, to meet again some of the old comrades in that memorable event.

My host, Colonel Wilkinson, had several other house guests, among them our old G.S.O. 2, and needless to say reminiscences were rife, and "lights out" seldom before 5:00 AM. We refought the Canadian Corps and many new angles were shed on sundry engagements. Incidentally, the subject of panics came to the fore and it may interest you to know that my theory—*that ridicule is one of the best weapons to combat such hysteria*—was endorsed by others who had similar experiences with that group madness—panic. This brings to my mind your suggestion that I write the incident I described to you the day we visited West Point, so here goes.

On June 2, 1916, the Germans (Wurtembergers) launched a furious attack on the Hooge-Swarteleen sector which was held mainly by the 3d Canadian Division. The attack was preceded all morning by terrific artillery preparation and the assault broke about noon with the explosion of a giant mine under Mt. Sorrel, a key position on the right of the Canadian line which protected the high ground of Observatory Ridge and Santuary Wood on the left. (See Figure 5). The 3rd Canadian Division was driven back some 500 to 1000 yards, losing the Mt. Sorrel and Observatory Ridge positions. Counterattacks were organized immediately, for the Germans now occupied the west and south rim of the saucer which composed the Ypres Salient, and could actually fire into the rear of the British positions to the north.

The 1st Canadian Division was charged with the job of re-establishing the positions at Mt. Sorrel and Observatory Ridge, but initial attacks were abortive for we were seriously handicapped by the uncertainty as to the location of the German new front line trench, which had been skill-

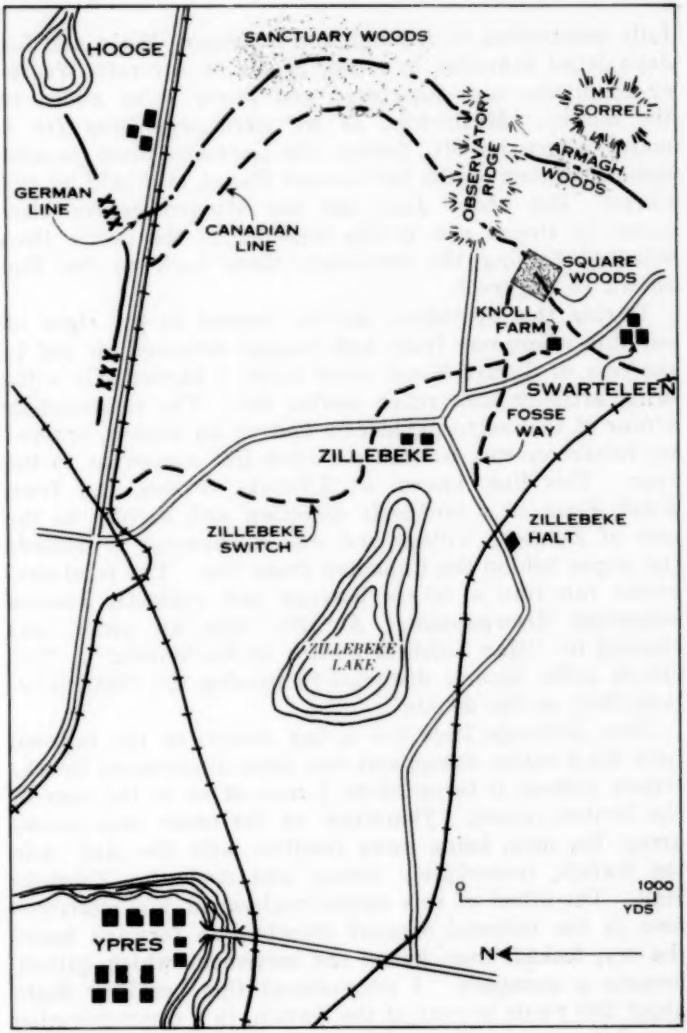
HOOGE
SANCTUARY WOODS
MT SORREL
ARMAGH WOODS
OBSERVATORY RIDGE
GERMAN LINE
CANADIAN LINE
SQUARE WOODS
KNOLL FARM
SWARTELEEN
FOSSE WAY
ZILLEBEKE
ZILLEBEKE SWITCH
ZILLEBEKE HALT
ZILLEBEKE LAKE
YPRES
1000 YDS
N

FIGURE 5.

fully constructed in Armagh and Sanctuary Wood and for days defied definition by either Scouts or Aircraft. Weather conditions also interfered and heavy rains added to the misery. Meanwhile, as we were organizing for a major attack on Mt. Sorrel, the Germans made several demonstrations on the left around Hooge, still held by our Corps. But about June 6th the Wurtembergers blew mines in Hooge and in the trenches to the north, then attacked forcing the defenders there back to the line shown in Figure 5.

During this operation, activity spread to the right of our line where our front and support defenses, in and to the rear of Square Wood, came under a particularly withering artillery and trench mortar fire. The commanding officer of that sector, evidently fearing an assault, ordered up reinforcements to man a switch line somewhat to the rear. This line, known as Zillebeke Switch, ran from Knoll Farm in a northerly direction and slightly to the east of Zillebeke Village and was constructed to enfilade the slopes behind the Canadian front line. The reinforcements ran into a severe barrage and evidently became somewhat disorganized. At this time an order was shouted to: "Man Zillebeke Switch on the 'double' ". This simple order became distorted in passing to: "Man Zillebeke Halt on the double".

Now, Zillebeke Halt was a flag station on the railroad used for a ration dump, and was quite unprotected by any trench system, it being about a mile or so to the rear of the Switch trench. Therefore, as the order was passed along, the men, being more familiar with the Halt than the Switch, immediately turned and made for Zillebeke Halt. The effect of this sudden retirement was electric—men in the battered support trenches up forward heard the cry, looked, then joined the movement which quickly became a stampede. I encountered this beadlong flight about 200 yards in rear of the Switch, in a communication trench known as Fosse Way. On learning the order I endeavored to stem the tide, realizing the error that had arisen in confusing Zillebeke Switch for Zillebeke Halt. A noncommissioned officer and one or two men checked

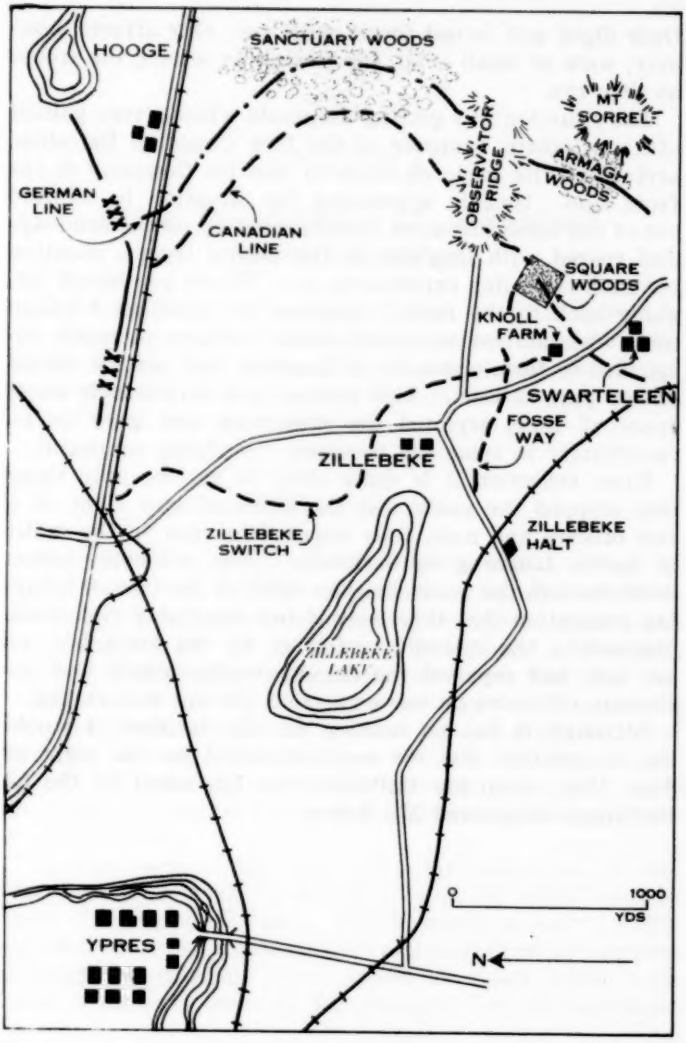
HOOGE
SANCTUARY WOODS
MT SORREL
OBSERVATORY RIDGE
ARMAGH WOODS
GERMAN LINE
CANADIAN LINE
SQUARE WOODS
KNOLL FARM
SWARTELEEN
FOSSE WAY
ZILLEBEKE
ZILLEBEKE SWITCH
ZILLEBEKE HALT
ZILLEBEKE LAKE
YPRES
1000 YDS
N

FIGURE 5.

their flight and joined forces with me. Our efforts, however, were of small avail, for panic was seizing the troops as they ran.

The situation was getting desperate when a very gallant officer, Captain Trimmer of the 10th Canadian Battalion, arrived on the scene en route to join his Company in the front line. Quickly appraising the situation he climbed out of the communication trench, stood up on the sandbags and roared with laughter at the fleeing troops, shouting out such ridiculing expressions as—"Where you bound for, going back to the farm?" Sensing his intention I joined him, whereat two noncommissioned officers promptly responded to form a quartet of laughter, 100 percent forced on my part at least. This action, in a surprisingly short space of time, arrested the movement and gave us an opportunity to issue the necessary rectifying command.

Upon reflection it is quite clear to me the only thing that stopped the panic was the extraordinary sight of a few officers and men, fully exposed to view in the midst of battle, laughing uproariously. This evidently percolated through the panic-stricken mind of the troops, bringing realization that they were doing something ridiculous. Meanwhile, the splendid resistance by the Imperials, on our left, had repulsed the flammenwerfer attack and the German offensive on our own front did not materialize.

Although it has no bearing on this incident, I would like to mention that we counterattacked on the night of June 13th, when my Battalion, the 1st, aided by the 3d Battalion, recaptured Mt. Sorrel.

CHAPTER 4

Some Possibilities of Motorized Reconnaissance

"Infantry may be required to cover great distances in reconnaissance, its mobility being increased, when practicable by the use of bicycles and motor transportation."
—paragraph 5c(1) Reconnaissance, Security, Marches, 1935, C. and G. S. School.

INTRODUCTION

It is true that we now have a comprehensive body of doctrine on the tactical uses of mechanized elements*. This doctrine, however, assumes completely mechanized tactical units for the most part; and where it does not, as in the treatment of the mechanized and motorized elements of horse cavalry, it at least assumes that armored-car squadrons and similar units are to be available. But for the present, is there not a distinct need for a temporary statement of employment principles that will serve to bridge the gap between non-mechanization and complete mechanization?

If war came at an early date our sum total of mechanized units would be far from what we might wish to have immediately in hand. And it would be some months at least before we could procure any considerable increase. During this possibly vital period of delay what steps could we take to perform, for example, the reconnaissance

*The Tactical Employment of Cavalry (Tentative) 1935, C. and G. S. School; and the Tactical Employment of Division Cavalry (Tentative) 1934, C. and G. S. School.

covering "great distances" that is indicated in the question at the head of this chapter?

It seems reasonable to make at this point three assumptions, before there is any attempt to answer the question just stated:

(1) If an infantry division has mechanized cavalry (or horse cavalry with adequate mechanized reconnaissance elements) attached, or if such cavalry is operating from higher units, ground reconnaissance by the division must nevertheless cover great distances at times. The mechanized units may, in fact, be four or five day's march (60-75 miles) ahead of the infantry elements;* hence far less than ever in the day when there were no motors can infantry afford to neglect its own reconnaissance measures.

(2) If horse cavalry, without adequate mechanized reconnaissance elements, is attached to an infantry division, or is operating from higher units, it would then devolve upon the infantry unit to conduct distant terrestrial reconnaissance to a still greater extent than under assumption (1) above.

(3) If an infantry division had no cavalry at all attached or operating from higher units, and higher units could furnish only air reconnaissance—not an inconceivable situation early in a future war—, the division would be responsible for all distant ground reconnaissance.

Whichever assumption we choose to make, then, it seems highly probable that forward, flank, and probably rear, infantry divisions will often find themselves straining their motor transportation to the utmost in order to complement aerial reconnaissance at considerable distances. What a division on an independent mission would do in any of these cases is not hard to imagine. In all likelihood, commanders throughout the division, just as they often do on maneuvers now, would use their own

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*Paragraph 13*e*, The Tactical Employment of Cavalry, 1935, C. and G. S. School.

cars and motorcycle messengers as the most immediately available reconnoitering means. And next they would borrow cars, and even trucks, whenever they could possibly be spared—and often when they could not—to assist in the most vital of all immediate preliminaries to battle —reconnaissance.

In view of these things there is a clear need for principles to guide us in such emergencies. We should have not only a technique of distant infantry reconnaissance but also a reasonable system of priority within the division for the employment of motors on such missions. A commander should not only know, in general, how he would scour the country a hundred miles to the front (flank) for information of the enemy. He should also have some idea of what particular means he will use. Let us examine the possibilities in this regard.

POSSIBILITIES OF THE NEW INFANTRY REGIMENT

The new infantry regiment described in the first chapter of this volume of the Mailing List is, except for the nine rifle companies and a few detachments, entirely motorized. The commander, let us say, of an advance-guard division of a large force, would have in four such regiments, a considerable sum total of motor transport to draw on for long-range reconnaissance. Arranged in approximate order of suitability (which corresponds roughly to availability) the totals are as follows:

Cross-country cars	88	
8-passenger, reconnaissance trucks	92	
5-passenger cars	8	
Motorcycles	88	(12 equipped with voice radio)
½-ton pick-up trucks	28	
1½-ton cargo trucks	476	

Of these vehicles it is not unreasonable to assume that

our division commander could borrow for distant reconnaissance purposes the following:

Half of the cross-country cars	44	
Half of the reconnaissance trucks	46	
Half of the motorcycles	44	(including the 12 equipped with voice radio)

These he could augment, if necessary, with similar borrowings from division special units and the division artillery brigade which we may assume as also largely motorized. These units, however, might not be able to spare their vehicles, even temporarily, quite as readily as the four infantry regiments or the two regiments of one infantry brigade. But certainly much could be accomplished with the 134 vehicles, listed above.

The division commander could, indeed, form a strong motorized reconnaissance detachment from his infantry if he needed to. The 134 vehicles would carry a total of 632 men including chauffeurs. To these could be added several motorized machine-gun companies to make up a stout division reconnaissance group capable of considerable resistance if need be, especially in countereconnaissance.

The necessity for a sizeable reconnaissance detachment of this kind goes almost without saying in this day of rapid movement. But would we actually have all these motors available soon enough if we were, for example, suddenly called upon to repel an invasion? In all probability we would. There is little doubt but that motor vehicles would immediately be available in quantity. If we could get them in no other way they could be obtained in the manner suggested and discussed in some detail in the next chapter, on The Use of Civilian Motor Vehicles in War. A motorized reconnaissance detachment is now so absolute an essential that it must come from somewhere. But let us leave matters of procurement to consider further the methods of using motors for reconnaissance.

GENERAL METHOD OF EMPLOYMENT

In general, the methods now laid down for armored-car reconnaissance lend themselves to adaptation for the use of non-armored vehicles. Let us examine these methods point by point and see what changes need be made.

First, with respect to cooperation with aviation, armored cars reconnoiter as—

(1) Ground agents to aid the aviation by supplementing and amplifying its reconnaissance. (This implies radio communication between cars and planes, although not necessarily.)

(2) Reconnoitering agents aided by aviation. (This also implies ground-air radio.)

(3) Reconnoitering agents operating alone. (This implies radio for intercommunication.)

But how much aviation are we likely to have cooperating with infantry in the first stages of a war? And what can it accomplish if we do have it? The answer to the first question is—very little. The demands of our air force, the need for continued shore patrolling, the protection of vital centers, losses from early enemy attacks on our airdromes—all of these are liable to weaken the aerial eyes of our ground forces soon after hostilities begin.

As to what observation aviation can accomplish cooperating with infantry in distant reconnaissance, let us remember that several things may greatly reduce or prevent entirely their work. The enemy is liable to hinder our observation not only by active counterreconnaissance measures in the air but also by keeping our planes high by his antiaircraft fires. The weather inevitably limits or prevents aerial observation at times. And the terrain occupied by the enemy may hamper greatly our aerial efforts to find out what he is doing. If we allow even as much as 100 square yards per individual, a heavily wooded area 10 miles square could hide every vestige of an army of 3,000,000 men. No wonder the few French planes available in August 1914 saw little enough of the German armies, in the Ardennes!

Thus, indeed, we can only conclude that much of our distant reconnaissance, and sometimes all of it, must be accomplished on the ground. Accepting this, let us consider in further detail the methods of using motors for the purpose.

COOPERATION WITH AIR OBSERVATION

From what we have just seen, it is probable that a motorized reconnaissance detachment from an infantry division and its components would, in the first stages of a war at least, work largely as a distinct agency aided at times by aviation. The commander would for the most part utilize both means of gaining information separately, cordinating their efforts himself. Direct cooperation between air and ground reconnaissance elements would be carried out whenever possible through radio; and without an organic system of radio communication between the two, could be effected to some extent through an air-ground code and through drop and pick-up messages. It seems reasonable to assume that axes of distant reconnaissance for such air-ground communication could be established and would be especially necessary, failing direct radio contact. But let us confine our discussion, now, to the purely ground measures.

OPERATION OF MOTOR RECONNAISSANCE ELEMENTS

If for any reason motors for reconnaissance were limited in number, it might not be possible to form and employ a main reconnaissance group. In this event, motorized patrols would operate in all desired directions out from the infantry force itself—usually from its security elements. Patrols would then report back to the commander at intervals through any means available, though often, we must assume, by messengers using cars or motorcycles since the availability of radio sets of sufficient range is a doubtful quantity.

A search by motor patrols out main roads only would be

inadequate. In most civilized countries today secondary roads as well as primary highways are good motor roads. An enemy force would be as likely to use one type of road as the other; and where the terrain offered cross-country routes, we could not expect the enemy necessarily to remain on the roads at all. Hence motorized reconnaissance must scour the countryside in every possible direction of approach, branching off from main roads to traverse side roads, follow parallel secondary roads, and investigate the terrain lying between, where it offers any chance of cross-country movement.

THE GROUND TO BE COVERED BY MOTORIZED RECONNAISSANCE

A single investigation of any given terrain area in the course of which no sign of the enemy is found, establishes nothing more than a fact which must receive the strictest literal interpretation. There is no enemy there *then*. But half an hour later the same area may be full of hostile motorized or mechanized units. In consequence of such possibilities it is apparent that motorized reconnaissance may be worth little unless, once established, it is conducted vigorously and continuously until—and after—the enemy is found.

This being the case, it becomes apparent that motorized reconnaissance for a distance of 50 or 75 miles out from a force is not a small task to perform. In order to get some idea of what it entails let us examine Figure 6. The small shaded area in this figure represents a large force which contains, let us say, 10 divisions. Let us further assume for simplicity that this force is for the moment concentrated in as small an area as the figure shows—an area 30 miles wide, and that there is a necessity for all-around reconnaissance.

The ability of large enemy mechanized and motorized units to cover long distances and to concentrate rapidly on our flanks or even our rear will undoubtedly make for considerable change in present doctrines of reconnaissance and even in the doctrines on the advance of large forces.

What value is the old-type cavalry screen, no matter how far to the front, if the mobility of the enemy enables him to swing far out to the flank, avoid the screen, and drive in rapidly with his mechanized and motorized forces?

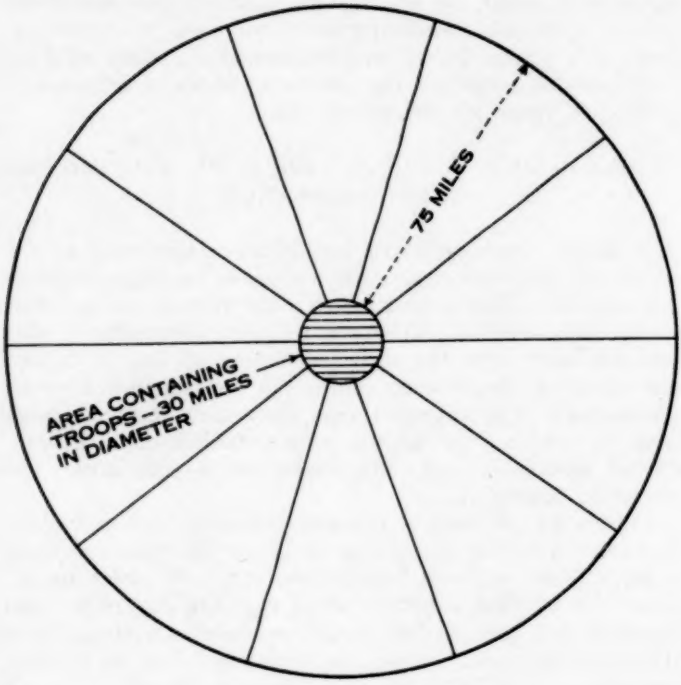

FIGURE 6.

Obviously, the cavalry screen (horse and mechanized), or any screen performing the same function, must be curved far back to cover the full depth of the flanks. Our thin advanced screen thus becomes a cuirass that may even have to protect the rear. By adopting this conception, taking the extreme case where the rear must be protected,

and then massing our force in a small area, we can simplify the problem for purposes of study to ascertain just what the reconnaissance problem is and how we can go about solving it. It goes without saying that a force of 10 divisions in a 30-mile area is crowded but this situation might well arise in a concentration or in a detraining area. (For the sake of schematic simplicity, also, we shall consider divisions only, omitting mention of other units.)

Now, further assuming that these 10 divisions are responsible for distant patrolling in all directions for 75 miles, we can draw a circle around the whole force, and by dividing it into 10 parts, see the sectors of terrain that the reconnaissance elements derived from each division (or from one brigade of each division) must cover. The average area each must scour in an all-around distant reconnaissance for the whole force is a wedge-shaped piece of terrain, 75 miles long, some 9 miles wide at its small end and some 60 miles wide at its outer perimeter —an area of roughly 2600 square miles.

Next let us consider one such reconnaissance sector separately as in Figure 7, in order to arrive at a clearer conception of the task involved in covering it with an efficacious reconnoitering screen. Figure 7 shows the network of roads that such a sector is likely to contain. For the sake of simplicity, however, let Figure 8 represent schematically the system of roads in Figure 7. Here we assume a rectangular road net cutting the reconnaissance sector at two-mile intervals in both directions, a schematic network comparable to that of Figure 7.

But how many miles of roads are there in this area of 2600 square miles?

The area contains roughly 2700 miles of roads. Now supposing as above that we have 134 motor vehicles of one kind or another available for continuous patrol of these roads, let us further assume that they can keep up an average of 20 miles an hour including all stops to investigate and report. These cars, then, can cover 20×134, or 2680, miles of road—almost the same total road mileage as that of the area—in an hour's time.

But once an hour is not often enough for motorized

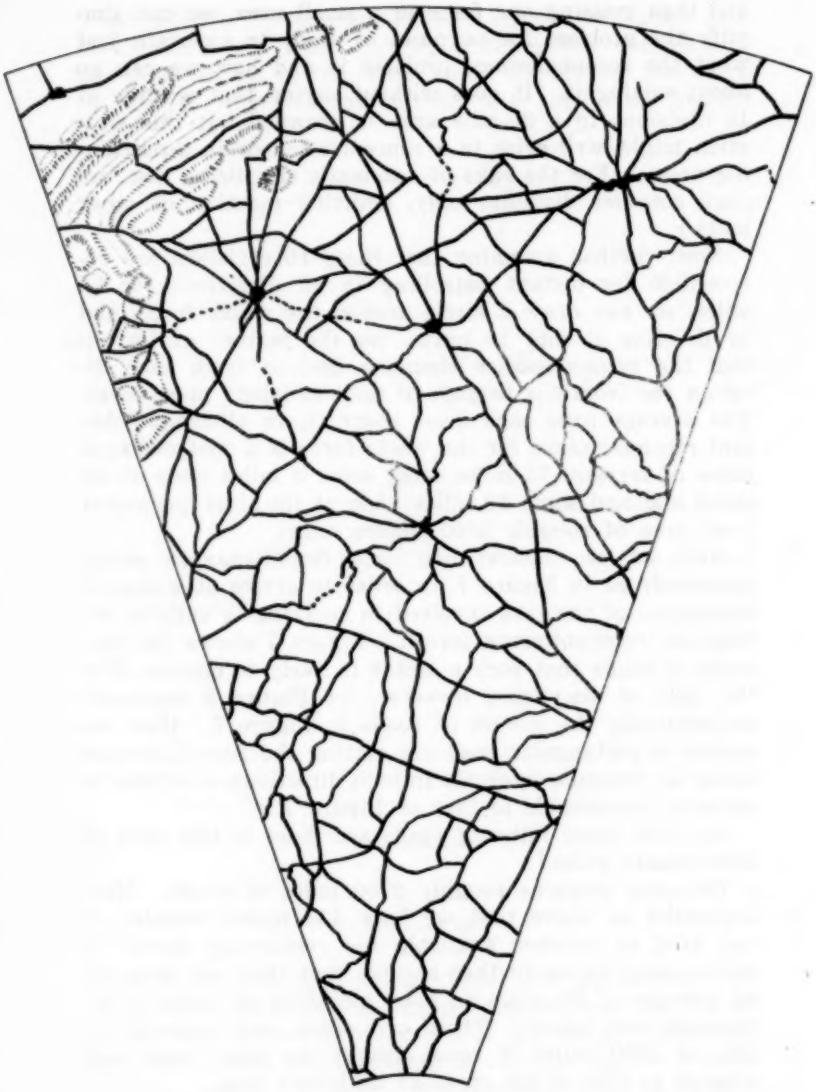

FIGURE 7.

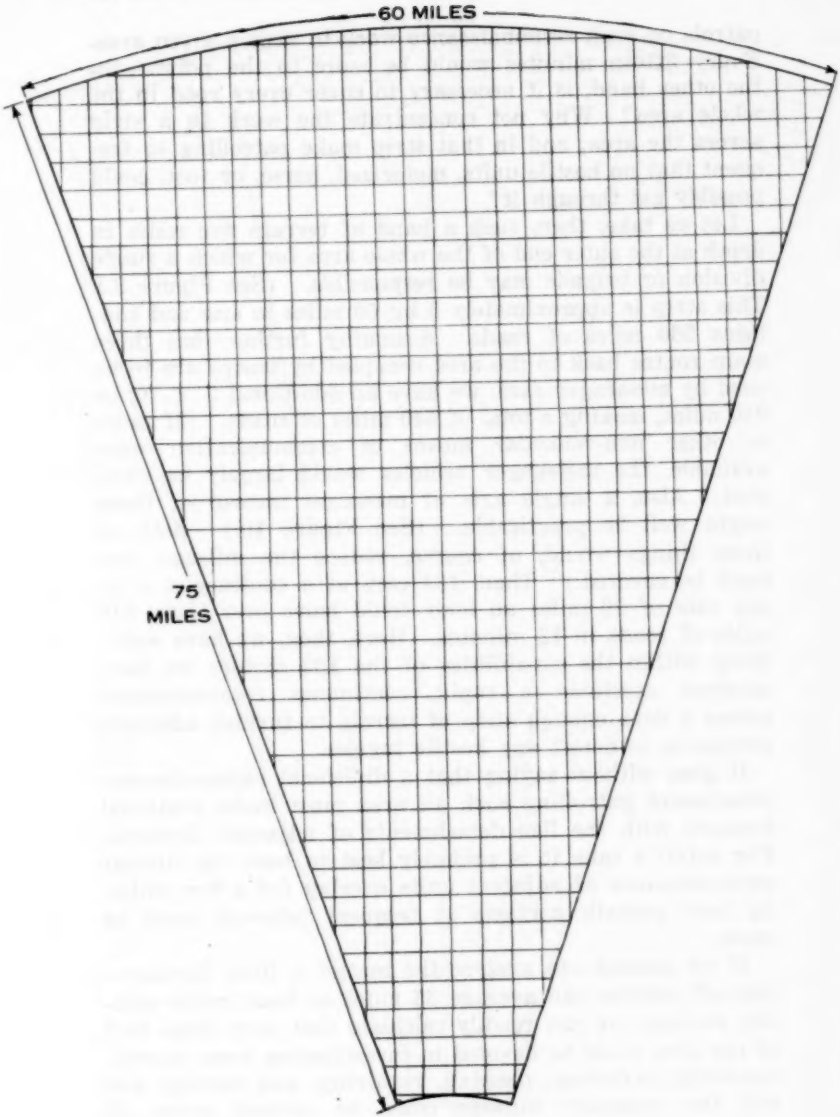

FIGURE 8.

patrols on such reconnaissance work to visit a given area. Every fifteen minutes would be more to the point. On the other hand, is it necessary to cover every road in the whole area? Why not concentrate the work in a strip across the area, and in that strip make patrolling so frequent that no hostile units, motorized, horse, or foot, could possibly get through it?

Let us take, then, such a band of terrain five miles in depth at the outer end of the whole area for which a single division or brigade may be responsible. (See Figure 9.) This strip is approximately 5 by 60 miles in size and contains 330 miles of roads. Assuming further that three main routes back to the area occupied by troops are to be used by messenger cars, we have an additional 3×70, or 210 miles, making a total of 540 miles of roads. (If radio or other non-vehicular means of communication were available, the messenger vehicles would largely be obviated. Also, a single axis of messages instead of three might well be practicable. (See Figure 10.) Both of these things would, of course, reduce the mileage that must be covered.) Then, 134 cars at a continuous average rate of 20 miles an hour could move over these 540 miles of roads in 12 minutes. Here, then, we have something within the capabilities of the 134 motors we have assumed available—a rapid, continuous reconnaissance across a deep enough strip of terrain to furnish adequate protection to detect any hostile ingress.

It goes without saying that a divisional reconnaissance detachment patrolling such an area must make continual contacts with the like detachments of adjacent divisions. For safety's sake it is probably best to have the distant reconnaissance of adjacent units overlap for a few miles. At least periodic contacts at frequent intervals must be made.

If we assume—to analyze the matter a little further—that all vehicles can average 35 miles an hour while actually moving, we can readily calculate that more than half of the time could be devoted to investigating areas slowly, reporting, refueling, messing, repairing, and resting, and still the necessary mileage could be covered every 15 minutes.

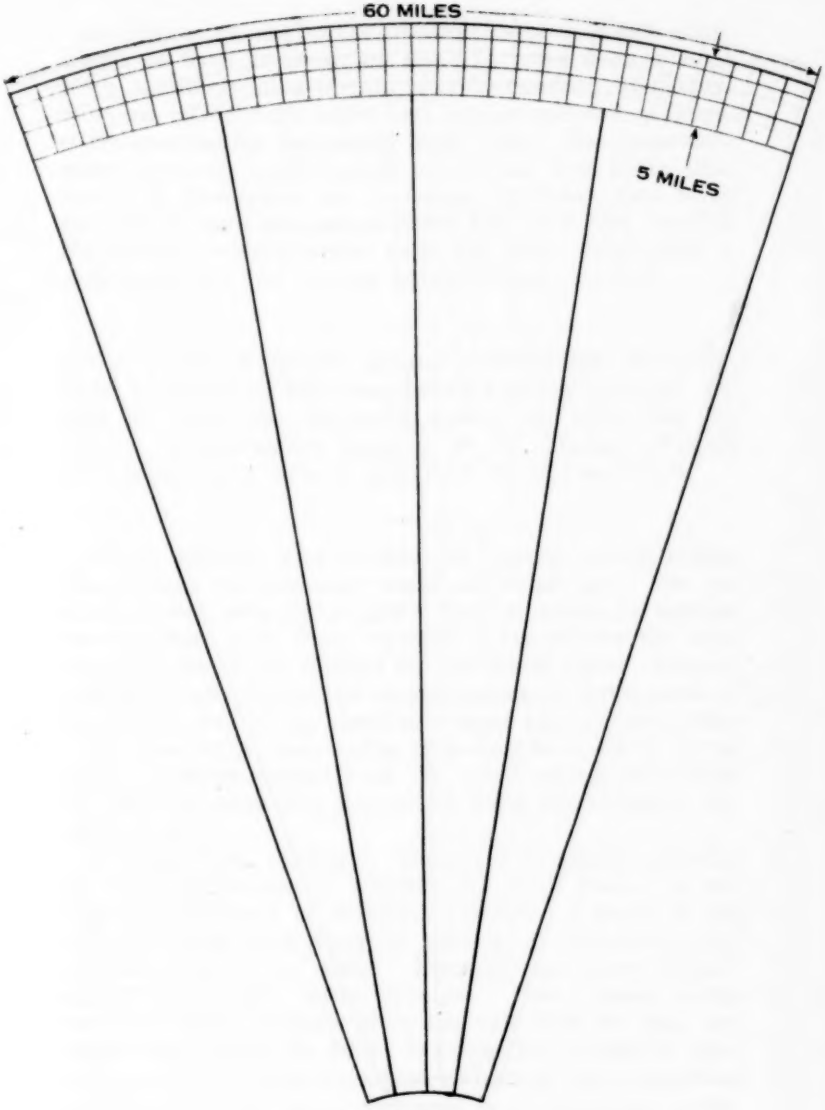

FIGURE 9.

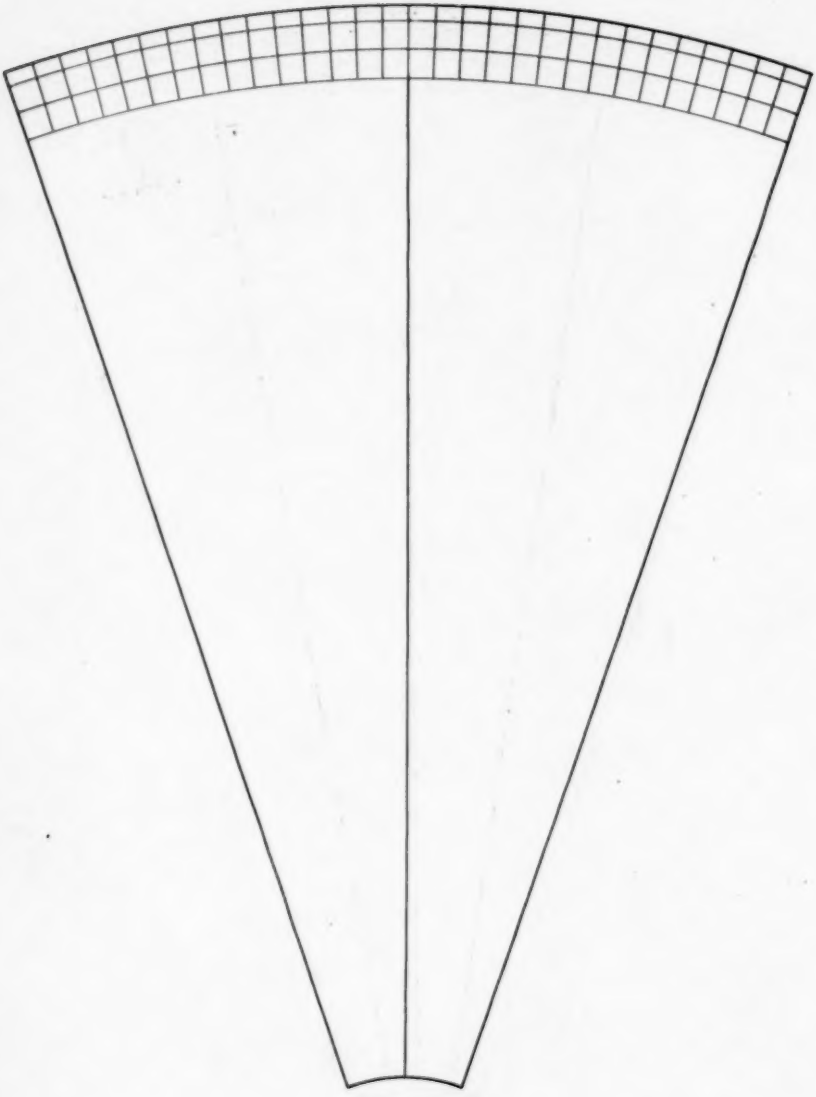

FIGURE 10.

In proceeding out to the five-mile reconnaissance strip, which we have assumed lies some 75 miles from a large force, the intervening terrain must be carefully, if hastily, searched. This work might best be accomplished, perhaps, if the commander designated phase lines. The reconnaissance elements would search out to the first phase line, satisfying themselves that no enemy lay closer, then cover the area to each succeeding phase line until they reached the distant reconnaissance area and there established a continuous and fast-moving reconnaissance schedule.

But is this schematic picture of motorized reconnaissance we have just been considering a typical picture? Or does it outline the maximum amount of work that the distant reconnaissance elements of an infantry division or brigade might have to perform? Or the minimum?

Often, perhaps, one or more of several circumstances would make the necessary work somewhat less. The reconnaissance area for a given division might be smaller because more units were available to reconnoiter the total area that had to be covered for the whole force. Terrain barriers might reduce the reconnoitering in large parts of the area. And if the country is open and contains numerous observation points, less time need be spent in movement. A more meager road net would contain less miles of roads to cover but necessitate more cross-country investigation.

Its magnitude, moreover, would not be greatly affected by the consideration of whether the whole force was engaged in offensive or defensive combat. A force on the offensive alternates between periods of movement and periods when it is static. Formerly an army largely moved by day and rested by night. Now, indeed, movement by night is more often the rule than by day, but either may readily be done. But whether a force is moving or still, the employment of efficacious reconnaissance detachments over great distances is a continuous neces-

sity. When a force moves, its ring of distant reconnaissance must move in the same direction and at the same speed. When a force is not moving, its measures of reconnoitering at a distance will have little difference, if any, whether the force is bivouacking for the night (or day) or whether it is organizing a defensive position for an occupancy of some duration. For the enemy, too, can move by day or night, and in this day, move quickly.

On the other hand, the area an infantry division might have to cover would, in many situations, be much larger. Where we have assumed 10 divisions in a small area, there would probably be half that number or less, with the same job to do. Again, a force of 10 divisions would, in the usual case, occupy a considerably larger area than one 30 miles across. Hence, the reconnaissance areas would in turn extend out farther and be accordingly larger.

Thus our example of a possible divisional distant reconnaissance task is neither maximum nor minimum but lies somewhere between the two. However we look at it, the job is a big one and one of vital necessity.

How far out distant reconnaissance should be conducted is also an important matter. In this discussion we have assumed that 75 miles is far enough. We have seen that this distance taxes the motor transportation that may be available. But in many a situation it may well be desirable and needful to extend our motorized antennae much farther. Is there any reason, for example, why in the possible event of an invasion of our continental limits, we should not keep track of the invader's progress from the moment he made his sudden incursion by means of a tightly-drawn cordon of motors in reconnaissance—a cordon that would withdraw in front of the advancing hostile army, but watch its every move, until our own could meet it? Such a reconnaissance might operate at hundreds of miles from our main force, cooperating closely with every other possible means,

air and ground, of gathering intelligence.

Thus, in conclusion, emphasis must again be placed on the need for distant ground reconnaissance—from the moment an army takes the field, for as long as it remains in the field. The agencies of the air will not be able to do all, if any great part, of this work for us. And when war begins what chance have we of adequate mechanized cavalry units to perform it? If these are not at hand, infantry must do the job; and if infantry has not the tools and the organization with which to do it, infantry must get the tools and improvise the units to use them. Certainly, in this nation of 20,000,000 motor vehicles, as the next chapter indicates, there can be no discouraging difficulties in that regard.

(*EDITOR'S NOTE.*—In a future number of the Mailing List another article will consider in detail the possible methods in which motorized reconnaissance could operate at distances from its main force, and also the possibilities of counterreconnaissance both hostile and friendly.)

CHAPTER 5

The Use of Civilian-Owned Motor Vehicles in War

It is now 20 years since civilian-owned motor vehicles were first used to increase the mobility of an army. On the night of September 7, 1914, and the morning of the next day, half of the French 7th Division (IV Corps) made its historic taxicab ride from Paris to the Marne, in order to support Manoury's Sixth Army. Not only taxicabs but every available piece of motor transport that could be spared from the city was put to use in this first of motorized movements. At that time the very idea of moving an army in automobiles, and especially in cars that the citizens of Paris had grown accustomed to see and use daily in time of peace, was novel and striking. Now, doubtless, the emergency use of the taxicabs in 1914 is becoming legendary. But whatever exaggerations the lapse of two decades may have added to the story, the garrison of Paris established in the fall of 1914 a precedent that was bound to require consideration in all wars thereafter.

Except to armies whose organic motor transport is ample enough to require no immediate increase, the use of civilian-owned motor vehicles for military purposes is likely to be a necessity at the beginning of every future war. Certainly such a step would have to be considered by our own army if it should become necessary to repel a sudden invasion either within our continental limits or in the Philippines. In fact, there are few places left in the world where the use of civilian-owned motors would not become an immediate problem in the event of war.

The use of such motors, moreover, is not likely to cease entirely during the course of a war unless the theater of operations remains the same for long periods of time. In the World War military vehicles were eventually produced in sufficient quantities to meet almost all military needs. The use of civilian-owned cars, however, continued to some extent throughout the war, for the most part by direct arrangement with owners, many of whom gave their cars for war uses. (Some of these cars were returned to their owners at the end of the war. One expensive English automobile of 1913 model is still in its owner's service today after a life of 600,000 miles, some 200,000 of which took place with Allenby in Palestine.)

In spite of the apparent probability that civilian-owned cars may be needed at the outbreak of a new war, our present war doctrines do not seem to include definite or detailed provisions covering this eventuality. Moreover, the use of civil cars has only recently begun to receive cognizance in map problems and maneuvers. Blues and Reds, equipped only in small part with motors have continued to fight their battles in a country where there are now some 30,000,000 civilian-owned automobiles of all kinds, paying little or no attention to the potentialities of such transportation.

Let us consider the familiar Gettysburg-Antietam area, for example (General Map, Gettysburg-Antietam, 1925, 1:21,120.) This is a well-populated farm region of about thirty by twenty miles, containing a number of small towns. Hanover, the largest, is a city of some 20,000 people. At a moderate estimate it contains 5,000 motor vehicles of one type or another. As in many cities of its size, its former street railway lines have long since been replaced by a bus system, which uses a score or more of forty-passenger vehicles.

Gettysburg, the second town in size, has a population

of 4,500 and aproximately 1,000 cars. Several other towns, such as New Oxford, Littlestown, Taneytown, and Biglerville, number their motor vehicles by the hundreds, and many smaller villages, proportionately. There are also about 3,000 farm houses shown in this area. At least half of these will have one or more vehicles.

Thus a rough estimate of the automobile census of this whole area indicates well over 10,000 vehicles with a capacity of 50,000 men or more. Many of these cars, of course, might have little military value because of their poor condition. But the fact remains that this area of 600 square miles is illustrative of the potential motor transport in all well-populated country areas of the United States.

And in spite of the thousands of cars actually in the Gettysburg area at the present day we still commonly maneuver imaginary units—most of which do not have enough organic motor transport—in this same region without regard to the tactical or strategical possibilities of the automobiles it contains. These possibilities are apparent to some extent in almost every map problem, whether it is located in the Gettysburg-Antietam area or any other part of the United States. Motor transport has become so thoroughly a part of our everyday civilization that it seems unreal indeed to leave it out of consideration.

That civilian-owned motor transport will be used whenever it is needed in actual warfare is hardly to be doubted. The best recent instances, perhaps, of the employment of such motors by armies in the field occurred during the 1932 Sino-Japanese conflict at Shanghai. Let us see what happened there.

The Japanese, as invaders, were limited as to commandeering area. They were able to supplement to a small extent, however, their organic motor transport, brought by ships from Japan, with vehicles obtained in the

occupied area. This area contained a Japanese population of several thousand, and a number of Japanese business firms were able to furnish additional trucks and cars for the friendly troops. Most of the Chinese-owned vehicles, of course, were withdrawn before the invading army. But some were captured and put to use.

(As a matter of fact, animal-drawn transportation, and rickshas and push carts, were also commandeered in large numbers. One Japanese brigade, which contained a large number of reserve troops, finished a 16-mile march with several hundred soldier and officer stragglers riding in rickshas at the tail of the column.)

The Chinese, on the other hand, possessing little military motor transport, made extensive use of commandeered and volunteered civilian-owned vehicles. Borrowed trucks of every sort were used to furnish the 19th Route army and other Chinese units with supplies and ammunition, to transport troops, and to evacuate the wounded. These vehicles were usualy marked with flags to indicate their military status. Civilian drivers were often employed.

The neutral troops, whose presence was necessary to hold the two opposing armies outside the boundaries of the International Settlement and the French Concession, used their own motor transport in large part. The British and French regiments in the city were well-equipped with cars and trucks as were the 4th United States Marines.

The Marine regiment had sufficient transport to be of great assistance to the 31st Infantry, especially during the first few days after its arrival. The 31st brought to Shanghai, however, only about a dozen light trucks of wartime models. Fortunately, the area including the billets and the defensive lines occupied by the 31st Infantry was little more than a mile square, with all the main streets and many smaller ones paved. Through the untiring efforts of Service company drivers and me-

chanics, the maximum of use was obtained from these old trucks. They were used for every purpose, but chiefly to carry food, charcoal, and other supplies to the units in the lines, and bring up shipments of supplies from the piers to the billets.

All fresh food supplies, however, were purchased from wholesale houses in the city and were delivered by these firms direct to the billets. This was equivalent to the use of civilian-owned motor transport on a large scale. Had conditions not made this possible, it would have been necessary for the regiment to augment its organic motor equipment by purchase or hire immediately upon its arrival in China.

Additional motor transport would also have been necessary if the 31st Infantry had had to obtain and transport its own engineer supplies to the defended lines. These, too, would necessarily have been civilian trucks rented or bought in the emergency. As it was, sandbags, barbed wire, and other materials were brought up by municipal trucks of the International Settlement or by vehicles of the Shanghai Volunteer Corps.

At the beginning of the emergency, the Shanghai Volunteer Corps—an international guard composed of several thousand foreign and native residents of the city—had already a considerable amount of organic motor transportation. Nevertheless, many additional cars of all types were found to be both welcome and necessary. The use of these cars was volunteered by individual owners and business firms, and, in many instances, chauffeurs were also provided with the cars. This additional transport proved to be indispensible to the efficient operation of the Volunteer Corps during the three months of the emergency period.

The Shanghai hostilities thus illustrate a number of different aspects of the use of civilian-owned vehicles in time of war. From the brief account above it can easily be seen that it is in the natural course of events for

modern armies to increase their transport in hostile territory by commandeering and requisitioning, and in friendly territory by hiring or buying, or even borrowing volunteered vehicles.

The use of civil vehicles seems bound to come up in any war of the future that takes place where automobiles are common. It is especially likely to be met with should the United States be called upon to repel an invading force. A maximum of mobility would be essential in such an event. There would be an immediate need for motor transport in such large quantities that existing stocks of commercial motors would hardly be sufficient to fill it. The use of civilian bus lines and other motor transport would immediately become highly desirable, especially in view of the fact that bus lines have replaced thousands of miles of railway, and also traverse much territory in which railways have never been built. This is especially true in the Philippines.

In the event of war, present regulations, based upon the constitutional rights of property, would preclude the outright commandeerng of motor vehicles owned by friendly persons. But as stated in Field Service Regulations (1923): "when the theater of operations is in friendly territory, available resources are used to the maximum consistent with the needs of the civil population." Much additional transport needed could be obtained by purchase or hire.

The use of hired trucks occurred on a large scale during the establishment of the Civilian Conservation Corps in 1933. Both the army commanders and the chiefs of the forestry personnel at each camp had authority to hire whatever truck transportation was necessary in establishing camps and in beginning the conservation work. This civil transportation was used until the camps received army and forestry trucks in sufficient number.

In war similar powers could be authorized. Their application, however, would have to be coordinated by higher authority.

The practicability of supplementing military transportation by non-military was further shown during the summer of 1935 when the entire personnel of the 106th Field Artillery (655 men) moved from Buffalo to Pine Camp, New York, in 133 taxicabs. The fleet of cabs made the 225-mile journey in approximately 11 hours, passing through the traffic of numerous towns and cities on the way. Movements of troops of exactly the same type could be made in time of war, not only to speed up the concentration of troops in training camps, but also to move non-motorized units to points in the theater of operations.

Once such units were within the theater of operations, a limited use, at least, could be made of this supplementary transportation. Reconnaissance alone would form a field of activity to which such cars might be an invaluable adjunct.

In hostile territory there is no question as to the right of an invading or occupying army to obtain supplies by purchase or requisition. This has been the custom in all past wars. The enemy, however, is liable to bend every effort to destroy or remove all materials of value. Further, enemy owners of motor vehicles will ordinarily find them the best means of flight before an invader.

Of course, it is entirely possible that the motorization of all regular units with army vehicles will be completed before any new hostilities arise. But there is sure to be some hiatus between the beginning of a war and the acquisition, through regular military channels, of enough motor transport for the needs of an army suddenly enlarged to many times its peace strength. During this interval the available transport in the theater of operations is certain to be used, just as railways were taken

over during the Civil and World War. Consequently there is a distinct need at present for some definite policy covering the use of civil vehicles and for the inclusion of the subject as an ever-present tactical and strategical consideration. This policy should cover such questions as the taking over of established bus lines, the uses of volunteered cars, the methods of obtaining cars in both friendly and hostile territory, the marking of such cars to identify them as military instead of civilian vehicles; the status of volunteer civilian drivers, the obtaining of fuel and emergency repairs. These points once established, it would be best to have no more map problems—and in fact, no more thought, of war—without full consideration of the possibilities of civil motor vehicles. As far as the actual uses of civil transport are concerned, these would differ little or not at all from any other motorization. Rapid strides are being made toward motorization, now a definite War Department policy. Civilian-owned motor cars simply form a source of vehicular supply that we need to take into full account.

CHAPTER 6

Military English

The Use of the Word "Some"

"Some" is a good old English word, but dangerously indefinite for military use. You can take it too many ways. These are its meanings:

An unspecified amount or number of—*I gave him some ammunition.*

An unknown or unnamed—*Some officer just called.*

An appreciable or considerable amount of—*The enemy has some aerial observation.*

Any that may be chosen or available—*Take some men and draw the equipment.*

Conjecturally or approxixmately the specified amount—*Some 400 casualties were reported.*

It also has a common slang meaning, with strong emphasis on the word, indicating a surpassing magnitude or quality—*This is* SOME *war!*

The danger in the military use of "some" comes from the ease with which its meanings may be confused. It is safer in military writing to use, either more definite words, or words still more indefinite. The following group of sentences illustrates the point:

The enemy has some air observation.

The enemy has air observation.

The enemy has a limited amount of air observation.

Enemy observation planes have appeared over our troops several times.

Some enemy planes have appeared over our troops.

Enemy observation planes have been seen over our troops.

A single enemy observation plane has been seen at medium altitudes over our troops three times today, at 8:00 AM, 11:00 AM, and 3:00 PM.

The last example is the best because it is the most accurate. It does not express a higher degree of accuracy than information or observation ordinarily permits. And it gives us a chance to estimate what the enemy actually does know about our troops. Any commander of troops in the field would know—if he and his staff had kept their eyes and ears open—the information contained in this sentence. The hour of the last visit of the enemy observer is especially important.

If it is desired only to convey the necessity for air cover and camouflage, it is best to say simply:

The enemy has air observation.

"The enemy has some air observation" finds the reader attempting to give "some" a definite value. One reader will scratch his head and think, "The enemy must have had a plane overhead several times today. Better not take any risks. I'll keep the troops under cover whenever possible." Another will think "'Some', eh? Well, that can't mean a lot. I guess we don't need to be very careful." A third will think, "Antiaircraft fire can probably keep those birds high enough so they won't see much." A fourth will yearn for definite information.

Had all four been battalion commanders actually on the ground, they would in all probability have definite information; certainly more definite information than "The enemy has some air observation".

CHAPTER 7

Initiative In Battle

(HISTORICAL MAP PROBLEM)

Constantly in a tactical situation, officers ask themselves,—what do my orders require? And often they follow these orders rigidly, forgetting that the tactical situation facing them governs all, and sometimes demands a modification of orders or even a complete change of mission. To follow orders blindly *then*, may bring on disaster, for the battle situation is a hard physical fact which cannot be avoided. By the stroke of a pen orders can be changed, but to change even a minor battle situation may cost a thousand men.

Thus the commander of any unit may be faced in the heat of combat with the grave question of changing his mission to a new one, because of events that have occurred since he last received specific orders. And when this necessity arises he must make his own decision. For on his shoulders is the burden; he stands or falls by what he does.

This is a hard place for a commander to find himself in. It is no place for the vacillating; no place for the morally timid; no place for the rigid formalist. It calls for officers with the clarity of mind to see the situation as a whole and their part in it, and the moral courage to modify or change a mission in accordance with the situation as it is, rather than stick rooted to orders based on a situation that no longer exists. The army that has such officers has a priceless asset.

No commander, we must remember also, can foresee everything; and once he turns his units loose to carry out

a tactical scheme, he is almost helpless if, because of the fog of war or any of the thousand and one exigencies of combat, his original conception turns out to have been faulty. True, he has his reserve; but events move too fast in many a battle for him to use it in time. It is often but a stop-gap at best, or even a forlorn hope, rather than a hammer to drive a wedge home. It is then, by all odds, that the commander of any echelon needs initiative in his subordinates—an initiative stout-hearted enough to change missions if the situation so dictates. But it must be an initiative with clear thinking, tactical sense and loyal subordination as its warrant, else only confusion and disaster will result.

In the German Army of 1914 this spirit of initiative was well developed. The action of Von Francois at Tannenberg is often quoted; but not so well known are the actions of a similar kind that occurred on the Western Front. It is nevertheless true that throughout the German forces even the commanders of small infantry units were imbued with willingness to take responsibility. Of this there is no better illustration than the action of the IV Reserve Corps on the eve of the Battle of the Marne. In this unit initiative proved a battle endowment of commanders from corps down to battalions. The story is worth recording.

The end of the first month of the World War finds the German armies, victorious in the Battles of the Frontier, advancing rapidly in pursuit of the French who give no indication that they intend to halt and risk a decisive battle. The German First Army under von Kluck, on the German right and marching southward, has crossed the Marne and is, on the evening of 4 September, directly east of Paris. The general direction of retreat of the armies on the left of the French line is south toward the Seine. It appears, then, that the Germans can expect to bring the French to battle in the area east and south of Paris and perhaps win a great victory that will dispose of France as an adversary.

Figure 11 shows where the elements of the German First Army were on the night of 4 September. Orders from First Army for 5 September direct a continuation of the march to the south. The IV Reserve Corps, now in

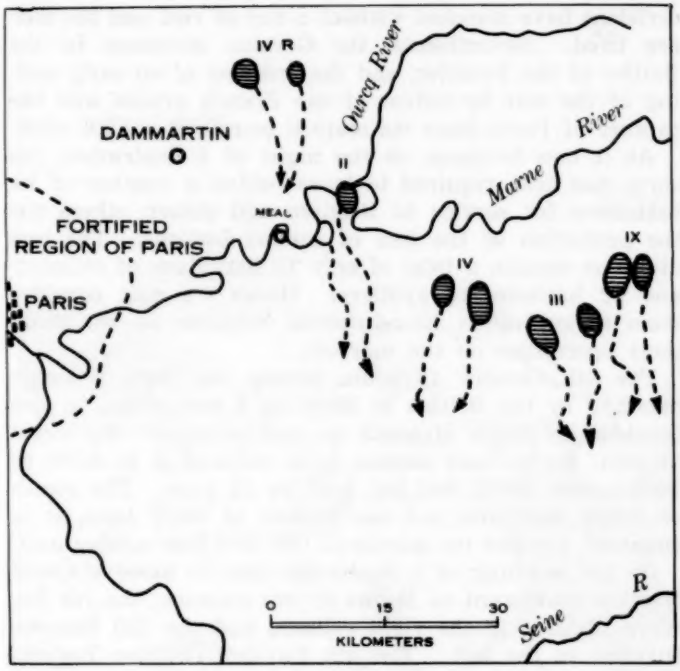

FIGURE 11.

echelon to the right rear of Von Kluck's army, with the 4th Cavalry Division attached, has orders to march to the vicinity of Meaux. Its mission is to protect the right flank of the First Army on the dangerous side toward Paris.

The IV Reserve Corps is made up of the 7th and 22d Reserve Divisions. The men of these two units are on

the average several years older than the men of the "active" or first-line divisions. They have some years since completed their tour with the colors and returned home. As civilians they have had but brief annual periods of training, and their units are now more like new organizations than old ones. For the past three weeks the divisions have marched without a day of rest and the men are tired. Nevertheless, the German successes in the Battles of the Frontier, and the prospect of an early ending of the war by defeat of the French armies and the capture of Paris, have maintained morale at a high pitch.

As it now bivouacs on the night of 4 September, the corps has been required to leave behind a number of its battalions for service in Belgium and detach others for the protection of the line of communications. The two divisions contain a total of only 16 battalions of infantry and 12 batteries of artillery. Hence we may consider them as equivalent to reinforced brigades as we study their operations on the morrow.

The 4th Cavalry Division, having met with a rough handling by the British at Nery on 1 September, is also considerably below strength as now attached. Its losses in men, horses, and cannon have reduced it to 1000 or 1200 sabers and it has but 4 of its 12 guns. The strain of heavy marching and the reverse at Nery have, it is apparent, lowered the morale of this first-line cavalry unit.

On the morning of 5 September the IV Reserve Corps marches southward on Meaux in two columns; the 7th Reserve Division in the right column, and the 22d Reserve Division in the left. The 4th Cavalry Division has received the mission of covering the right flank and reconnoitering toward the west.

The situation as known to the IV Reserve Corps is vague. The main French armies have apparently been defeated. There must be some fortress troops in Paris undoubtedly, and some regular units have probably taken refuge there. The bulk of the French field army, it is believed however, is retiring toward the Seine. The First German Army is vigorously pursuing to strike the French left flank, which the hazy information indicates is some-

FIGURE 12. CHAPTER 4
MAILING LIST. VOL. XI
SITUATION
EVENING OF SEPT 4. 1914
AND MOVEMENTS ON
MORNING OF SEPT 5. 1914
5811-74-36
CHANTILLY FOREST
NANTEUIL - LE HAUDOUIN
ETAVIGNY
LE PLESSIS BELLEVILLL
OISSERY
MAY - EN MULTIEN
MARCHEMORET
BOIS DES TILLIERES
ST. SOUPPLETS
MARCILLY
ETREPILLY
MONTGE
11:00 A M SEPT 5th
BARCY
LE PLESSIS - L' EVEQUE
MONTHYON
VARREDDES
CHAMBRY
IVERNY
VILLEROY
PENCHARD
NEUFMONTIERS
PARIS 8 KM
CHAUCONIN
MEAUX
TRILPORT
MONTCEAUX
Thérouanne R.
Ourcq R.
Marne River
Beuvronne R.
1000 METERS
0 1 2 3 4 5 6 7 8 9 10 KILOM

FIGURE 12.

what to the southeast of Meaux.

On 3 September, German aviation reported strong French forces—two army corps at least—in the vicinity of Dammartin. (See Figure 12.) On the following day, this force could not be found; its sudden appearance and disappearance became a mystery. Were these French troops a part of the permanent garrison of Paris, presumably second-rate troops, or part of the retreating French armies?

As they move along on the 5th, the leading elements of the infantry columns of the IV Reserve Corps reach the Therouanne River about 9:00. By this hour General von Garnier, the commander of the 4th Cavalry Division, is becoming anxious. He has sent out strong patrols to the south and west at dawn. Detachments also have pushed southward toward Vardeddes to find no enemy there, and toward the hill of Monthyon. But his patrols to the west have encountered French cavalry everywhere, and report that a French cavalry division seems to be advancing from the direction of Paris via Dammartin. There is something unusual in all this. General von Garnier considers the weakness of his division and then sends a request to General von Gronau, commanding the IV Reserve Corps, for a brigade of infantry to support his cavalry. Meanwhile General von Garnier assembles his division near Oissery, ready for combat.

At 11:00 AM the leading elements of the 7th and 22d Reserve Divisions halt at Barch and Chambry, respectively. They have reached their march-objectives. The troops stack arms and fall out while the rear elements of the columns close up. The rest is welcome to the weary troops. There is no rest for some of them, however; the corps commander has acted on General von Garnier's message. Two battalions of infantry and two of field artillery from the 7th Reserve Division march to the west toward St. Soupplets and Monthyon to support the 4th Cavalry Division.

The corps commander, General von Gronau, establishes

FIGURE 12, CHAPTER 4
MAILING LIST, VOL. XI
SITUATION
EVENING OF SEPT 4, 1914
AND MOVEMENTS ON
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5811-74-38
CHANTILLY FOREST
NANTEUIL - LE HAUDOUIN
ETAVIGNY
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OISSERY
MAY - EN MULTIEN
MARCHEMORET
BOIS DES TILLIERES
ST. SOUPPLETS
MARCILLY
ETREPILLY
MONTGE
11:00 A.M SEPT 5th
BARCY
LE PLESSIS - L' EVEQUE
MONTHYON
VARREDDES
CHAMBRY
IVERNY
VILLEROY
PENCHARD
NEUFMONTIERS
PARIS 8 KM
CHAUCONIN
MEAUX
TRILPORT
MONTCEAUX
Marne River
1000 METERS
0 1 2 3 4 5 6 7 8 9 10 KILOM

FIGURE 12.

his headquarters at Marcilly and there receives the information gathered by General von Garnier's cavalry patrols. The enemy is now reported moving troops of all arms eastward from the vicinity of Montge and Dammartin. Enemy cavalry activity is noted west of Penchard and Monthyon.

But the strength of the enemy is unknown. In fact, the weak 4th Cavalry Division is unable to find out whether the French are an army or a brigade. It does not, and apparently cannot, answer the question to which the corps commander must have an answer.

DISCUSSION

The problem confronting General von Gronau is puzzling. What has this enemy in mind, this enemy who until now has been retreating, fighting rear-guard actions? Are these troops to the west merely Paris outposts attempting to harass the IV Reserve Corps as it swings past the capital? Has the governor of Paris massed the reserve of his garrison for a stroke against the IV Reserve Corps? Is there a whole army hidden behind the veil, or is it merely a cavalry division with a battalion or two of infantry supporting it?

Can it be possible, wonders General von Gronau, that the French, unknown to the German High Command, have managed to group strong forces on the west flank of the Imperial forces and are now about to take them all in flank and rear? Such an idea seems at first absolutely

out of the question. Surely the German High Command could not have swung past Paris like this, leaving only one weak corps north of the Marne, if the French had a strong force in Paris. And yet, if this could possibly be the case, von Kluck and his First Army are now in a dangerous predicament. If things are actually that serious von Kluck must be told before his army gets too far south; and there is no one but von Gronau to tell him. His is the mission of protecting the flank of the First Army from the direction of Paris.

Old General von Gronau thinks of his troops. The IV Reserve Corps, really little more than a division, is tired. The foot troops have reached their march destinations. Perhaps they can be allowed to rest while the cavalry clears up the situation? Might not intervention by the entire corps be premature?

Next the corps commander revolves in his mind the several courses of action open to him. He can reinforce his cavalry by an infantry brigade and make a reconnaissance in force to clear up the situation, and let the bulk of his corps rest meanwhile in its present position. He can take up a defensive position, sending out strong reconnoitering detachments. Or he can march west with his entire corps to attack the enemy. He can remain in a position of readiness, inform von Kluck of the situation, and await orders from him. In fact, these are only a few of the many things General von Gronau can do at 11:15 AM, 5 September 1914.

FIRST REQUIREMENT

What would you have done?

HISTORICAL SOLUTION

After a few moments more of thought General von Gronau turns suddenly to his chief of staff and says: "This is no time for vacillation. We will attack to the west."

Forty-four years before, in 1870, General von Gronau had fought as a lieutenant in the Battle of Vionville. And on this day in 1914, he remembered how his corps commander, finding himself in advance of the remainder of the army and confronted by an obscure situation, had attacked to find out what was actually in front of him. The results had been of almost incalculable value to the Prussian cause. "Here", we can almost see General von Gronau thinking, "is the same damn situation, except that even more depends on it this time". And so he attacked.

There was something out there in front—something big. Further reconnaissance might develop it, but already his cavalry feelers had, time after time, been unable to penetrate the enemy screen. An attack in force would clear things up if anything could.

A brief order: "The 7th Reserve Division will march westward at once on St. Mard, moving through Monthyon. The 22d Reserve Division, echeloned to the left rear of the 7th, will move on Monthyon via Penchard. The 4th Cavalry Division will move on Dammartin via Marchemoret. The enemy will be vigorously attacked in order to clear up the situation".

General von Gronau signs the order, calls for his automobile, and leaves at once to visit his division commanders. The die has been cast.

COMMENT

Your stickler for form, or the commander who always plays safe, would have taken the easiest way out. He would have taken up a position in readiness, or a defensive position, reconnoitered to the west, and informed von Kluck of his decision. Undoubtedly further orders would

have come. And thus he would have risked little and lost nothing except time. But von Gronau was made of a different stuff. Besides he remembers what happened before. He turns his corps at right angles to the advance of the main German forces and attacks straight into obscurity. He may not run into an overwhelming force. But if he does, and meets an advance coming from the south at the same time, he will be in a bad way. If that occurs, only luck, or a high degree of initiative by all subordinate commanders, will prevent disaster. He will get his information but at the loss of his corps—the flank guard of the First Army. Whatever happens, though, he will gain information and time for von Kluck. How golden time was on that September morning we shall soon see. But for the moment we shall take leave of the IV Reserve Corps commander marching into the blue of the west, and see what happens to one of his smaller units.

At 1:30 PM the 82d Reserve Infantry Regiment, the leading element of the main body of the 22d Reserve Division, on the march westward from Chambry, is approaching Penchard. (See Figure 13 which will be found in the pocket at the end of the book.) Colonel von Buttlar, regimental commander, who is marching at the head of the regiment, knows that things are beginning to happen. Not so much yet; but he knows that the 7th Reserve Division has marched from Barcy on Monthyon. Just where it is at the moment he does not know. However, he hears artillery firing somewhere near Monthyon. The sound of it is increasing in violence.

Colonel von Buttlar knows too that the advance guard of his division (22d Reserve)—two battalions of infantry and a battalion of field artillery—reached Penchard without opposition, and was then directed to move north toward Monthyon. The infantry of the advance guard has almost reached the town and its artillery, the 1st Battalion 22d Reserve Field Artillery, is in a position in readiness near Automne Farm.

Another messenger has brought word that the 1st Re-

serve Horse Jagers, the cavalry regiment of the 22d Reserve Division, on moving to hill *164*, there surprised with fire a French cavalry regiment near Neufmontiers. The hostile cavalry fell back in disorder to the west. The bulk of the 1st Reserve Horse Jagers, dismounted, according to the report, is still on hill *164*.

German cavalry patrols have also just reported that Meaux is clear of the enemy.

Behind the 82d Reserve Infantry in column on the road are the 2d Battalion 22d Reserve Field Artillery and the 32d Reserve Infantry (less two battalions). Two battalions of the 32d Reserve Infantry are in corps reserve and have been ordered to march directly on Monthyon from Barcy. Thus the main body of the 22d Reserve Division contains only four battalions of infantry—the entire 82d Reserve Regiment and one other battalion.

As he rides into Penchard at 1:45 PM Colonel von Buttlar receives further information, and orders as well, through a division staff officer:

The 7th Reserve Division is strongly engaged near Monthyon against an enemy who has come from the west. At Iverny, and to the west and southwest of that town, thick hostile columns of infantry and artillery have been seen moving east and southeast. Our artillery seen unlimbering in haste south of Monthyon has been taken under effective hostile artillery fire. Riflemen in khaki uniforms have been advancing from south of Iverny toward Chateau Gaillard Farm. Their patrols are now only a few hundred meters west of that place.

This enemy advance threatens to take in flank the 7th Reserve Division, and also the 22d Reserve Division as it moves north on Monthyon. The division commander intends to meet this threatened envelopment by an attack.

"Your regiment," directs the order, "will attack without delay in the direction of le Plessis-l'Eveque, taking the hostile advance in flank. The divisional artillery, from a position north of Penchard, will support you.

"The infantry of the advance guard, followed by the remaining battalion of the 32d Reserve Infantry, will

continue the movement to a covered position east of Monthyon where these three battalions will become the division reserve.

"The division command post will be at Chateau Gaillard Farm.

"Both French Colonial troops and British troops are known to wear khaki uniforms".

By 2:00 PM the 83d Reserve Infantry is assembling northwest of Penchard. The leading battalion, the 3d, has halted with its head near the clumps of trees just west of RJ 117. It is preparing to deploy in anticipation of receiving orders for an attack to the northwest. The 1st Battalion, the Regimental Machine Gun Company, and the 2d Battalion, have been directed to assemble just west of RJ 117. Rear elements of the 2d Battalion are on the road some 500 yards northeast of Penchard. The regimental commander and his staff are near RJ 115.

Colonel von Buttlar has just made a brief reconnaissance from the northern slopes of hill *164*. He has seen German artillery shells bursting near le Plessis-l'Eveque and Iverny. No large bodies of French infantry were visible although heavy rifle firing is still heard to the northwest and strong forces seem to be engaged. The columns of French that were reported near Iverny appear to have taken cover or deployed. Toward the west and northwest are cultivated fields and meadow land, offering little cover.

The cavalry units still occupy hill *164* and occasional shots are heard from that direction. A squadron of German cavalry has been seen moving toward hill *164* from the direction of Monthyon. The 82d Reserve Infantry has sent patrols to hill *164* and to the northwest.

With the situation well fixed in your mind put yourself in Colonel von Buttlar's place at RJ 115. You have been directed to attack without delay in the direction of le Plessis-l'Eveque. It is now 2:00 PM and as you study the

situation you are waiting for your majors to report for orders. Around you the battle is developing and information continues to come in.

At 2:01 PM you hear the sound of small-arms fire from hill *164* increase noticeably. The cavalry there soon reports that it has seen enemy patrols in khaki uniforms to the west of the hill.

At 2:03 PM this information is repeated by one of your mounted officers who has been over to hill *164*. He says about a squadron of cavalry is there firing at enemy infantry patrols to the southwest of the hill.

A minute later you see a squadron of German cavalry come from the north and gallop to the western slopes of hill *164* and then disappear. The squadron receives some

long-range rifle fire from the west during the movement and one or two men are hit.

By 2:05 PM your battalion commanders have all assembled at the command post to receive orders. But before you have a chance to begin, a cavalry sergeant from the divisional cavalry dismounts and reports: "Strong English forces are advancing from the west. They have reached the road west of hill *164*."

You ask him what he means by "strong". The sergeant replies: "I don't know. That's what they told me to say."

SECOND REQUIREMENT

What are you going to do now?

SOLUTION AND DISCUSSION

When the cavalry sergeant reported that strong English forces advancing from the west had reached the road west of hill *164*, Colonel von Buttlar was about to issue his order for his regiment to attack in the direction of le Plessis-l'Eveque. The developments of the preceding five or six minutes confirmed his previous knowledge that the cavalry on the hill was engaged against enemy forces to the west and southwest, and also brought out the fact that French infantry has been seen southwest of hill *164*. But the colonel himself saw the movement of an additional squadron of friendly cavalry to hill *164*, which appears to counterbalance the French infantry threat.

The report brought by the cavalry sergeant, however, is serious, although not sufficiently alarming to justify the abandonment of the attack toward le Plessis-l'Eveque. Yet it does appear to warrant a modification of the attack plan that will insure possession of hill *164* to the 82d Reserve Infantry until the situation west and southwest of the hill clears up.

Consequently, Colonel von Buttlar should order a battalion, preferably with a section of machine guns, to hill *164* at once in order to protect his left flank. Moreover, the regimental commander now has a definite fire mission for his supporting artillery. The improved road west of hill *164*, from Viry Brook to the junction with the Iverny-Neufmontiers road, is a suitable place for a concentration in an effort to stop the enemy threat from the west. He should request fire on this line immediately.

SITUATION CONTINUED

Still you are Colonel von Buttlar. The battle growls to the southwest and west. Again, before you have time to issue any orders, a lieutenant from division headquarters reports to you. He states that he has been sent to inform you that Corps attaches great importance to the early intervention of the 22d Reserve Division in the direction of le Plessis-l'Eveque, and that consequently the 82d Re-

serve Infantry must launch its attack without delay. The 7th Reserve Division has been reported seriously engaged. After delivering this message the lieutenant rides off.

While you are thinking that over briefly an officer known to you rides up to the command post and says, "I am Major Hart and command the 2d Battalion 66th Reserve Infantry of the 7th Reserve Division. We were in reserve behind Monthyon Hill. I rode to that hill (pointing to hill *164*) with my adjutant to reconnoiter. Do you know the situation there? African troops appear to be enveloping the west edge of the wooded hill (again pointing to hill *164*.) They extend well south of it, too. There are several battalions of them. It's a strong attack and the enemy is getting close. There are about two squadrons of our cavalry on the hill fighting dismounted."

As Major Hart talks to you, the firing around hill *164* grows heavier. And as he finishes you realize that the sound of firing from the direction of Iverny and le Plessis-l'Eveque has also increased. It is apparent, too, that in the last few minutes the French artillery has gained a decided fire superiority over the artillery of the 7th Reserve Division. The fire of the latter has weakened noticeably. Observers from hill *164* soon report one German battery southeast of Monthyon subjected to a concentration of hostile artillery fire and virtually destroyed. Another, immediately afterward informs you, "Some French skirmishers can be seen from the hill advancing from Iverny toward Monthyon."

At 2:11 PM you see two batteries of the 2d Battalion 22d Reserve Field Artillery, which marched immediately in rear of the 32d Reserve Infantry, going into position near Automne Farm. The third battery is advancing toward hill *164*. You estimate that the 32d Reserve Infantry (less two battalions) followed by the trains must be about a mile east of Penchard.

While the thought is flashing through your mind several cavalrymen from hill *164* pass you shouting, "The English army is just over the hill. We can't hold."

Here we have a battle situation,—something that actually occurred in war. This is no problem evolved out of an instructor's inner consciousness to illustrate a principle and incidentally be-devil the solver. Here we can make no assumptions; we can neither verify orders nor get them changed. Here are but the brutal facts of battle;—war as it is; a commander faced by the usual and not the unusual.

Let us stop to reflect for a moment, thankful that we can reflect—something that Colonel von Buttlar could not do. His reflection and mental digestion, we can imagine, could hardly keep up with the information that poured upon him.

The essentials of the situation are these:

Colonel von Buttlar has his orders. They are definite and explicit. "Attack toward le Pessis-l'Eveque." These orders were reiterated only a moment ago by an officer from Division Headquarters. He can see for himself, moreover, that the 7th Reserve Division is in a critical position. His intervention is needed toward the west. But to the south develops a menace to the whole corps, rising crescendo-like in the last ten minutes.

What to do?

THIRD REQUIREMENT

Well, what do *you* do?

DISCUSSION AND SOLUTION

To Colonel von Buttlar Major Hart has brought the most opportune and important news of the last few minutes. And as soon as he learns from this reliable source how serious the attack from the south and southwest is, he must abandon his assigned mission and move to hold hill *164*. There is nothing else he can do. For if this key locality falls to the enemy, the flank and rear of the whole corps will be seriously menaced. Besides, if the enemy takes the hill, the regimental mission will be impossible to accomplish at any event.

Now that he decides to make war on his own, Colonel von Buttlar sees that two plans are open to him. He can occupy the hill at once and defend it from the western and southern edges of the woods on its slope. Or, he can attack at once to the southwest as far as the Iverny-Neufmontiers road.

The first plan is simpler to execute. It should effect a much better defense than if an attack were to break down and force the regiment to take up a defense farther down the slope of the hill, in close contact with a superior force. On the other hand, a defense relinquishes the initiative to the enemy and indicates weakness.

A limited objective attack, even against a superior force, will probably come as a surprise and therefore has an excellent chance of succeeding. And if it should not succeed Colonel von Buttlar can still defend hill *164*. Against an inferior force an attack is almost certain to be successful and to result in driving the enemy south of Rutel Creek. Colonel von Buttlar could then leave part of his regiment to hold the hill and proceed on his mission with the remainder.

There is no mistake about it, an attack is the thing.

The artillery mission given a few minutes since must be changed also.

Major Hart has reported that the hostile attack is to the south as well as to the southwest of hill *164* and that it is *"getting close"*. An immediate request for concentrations 500 yards from and parallel to the southern and southwestern edges of the woods on the hill should meet the situation now. If the artillery cannot fire this close to the woods, then it should come as close to the mark as it can.

COMMENTS

It is well to point out here while the incident is still fresh, how General von Gronau had unwittingly to depend on the initiative of a subordinate to cover his corps. First, von Gronau himself throws orders to the winds and heads for battle with the unknown. And when within two hours of his decision strong forces roll up against him from the south and west, and he, like von Kluck, has the point of a dagger in his side, a subordinate of von Gronau's own mettle in turn reads the smoke of combat—and acts radically and quickly.

But will this bring von Gronau out unscathed, and will it get for him the information he needs so badly? For he is still in the dark? That we cannot yet tell.

CONTINUATION OF THE SITUATION

Von Buttlar's 3d Battalion, on the right, now advances along the northern edge of the woods on hill *164* in the general direction of Villeroy. The 1st Battalion goes straight over the top of the hill toward Neufmontiers with the regimental staff just in its rear. The 2d Battalion and the machine-gun company in regimental reserve are following, by bounds, behind the interval between the leading battalions.

The commander of the 2d Battalion is Major Bachfeldt. He has brought his rear echelon unit up into the woods on the northern slope of hill *164*, about 500 meters southeast of RJ 115. And there let the reader undergo one

more demotion and take over the battalion from the major at 2:50 PM.

You have a report that the 3d Battalion has reached the west edge of the woods on the hill. This is probably true because heavy firing has been going on in that direction. Of the 1st Battalion, you know that it has pushed with great difficulty through the extremely dense woods on the top of the hill where it has had a hand-to-hand fight with Moroccan troops. By now the 1st Battalion is somewhat scattered and you do not know exactly where it is or what situation now confronts it. You are also out of touch with the regimental commander. The last few runners you have sent forward to regiment have not come back, but you have a report that there are Moroccans in the eastern part of the woods on the hill. What you do know of the present situation has come from your patrols to the front and to the flanks. A lieutenant sent with a squad to investigate the situation in the eastern part of the woods, however, has not returned. The firing near Monthyon and Iverny continues violently and from the sound of it the German artillery there seems to be dominated by the French.

You are, remember, in battle and not facing a synthetic problem of the schoolroom. Your mission is to follow the assault battalions by bounds. Later Colonel von Buttlar will need you to carry out his scheme of maneuver.

You establish, for the moment, a command post in the

edge of the woods and then go to a nearby rise to see what you can of the developing combat. You have been observing for only a minute or two when you see a German battery of artillery withdrawing from its position on the west slope of hill *164*. As you watch the caissons galloping down the slope you hear a violent fusilade of small-arms fire from the direction of Penchard. Then the withdrawing battery halts as it crosses the road leading northwest from Penchard and seems to be going into position facing southeast. The heavy firing to the west continues.

A minute or two later two men report back from the officer patrol sent to the eastern part of the woods on hill *164*. The lieutenant has been killed, they say, and the woods are full of Moroccan snipers.

It is now half an hour since you have been in touch with the regimental commander. You have no idea where he is.

At 2:55 PM a noncommissioned officer from the battalion combat train rushes up to report: "Moroccans are in Penchard. They caught us in route column and are shooting up our trains on the road. They came from the southwest. There's a whole regiment of them in the village."

As he finishes, a patrol leader comes back from the east edge of the woods on hill *164* and reports: "There's a lot of fighting going on in Penchard. Over on the Chambry-Penchard road the division trains are in a mess. They are flying eastward in a panic. A lot of the wagon drivers were hit by the enemy."

At 3:00 PM two runners who have been forward looking for the regimental commander report that snipers prevented them from getting through the woods.

FOURTH REQUIREMENT

Your actions, if any.

DISCUSSION AND SOLUTION

Some of the developments of the last few minutes draw Major Bachfeldt's attention to the east flank of the regiment. New patrols to the eastern portion of the woods, if they get back, should soon provide information of the situation as far to the southeast as Penchard.

Major Bachfeldt has also just received information that clearly indicates a strong force of the enemy near Penchard. This is a serious threat to the regiment and it's up to Major Bachfeldt now to do something quick. If the colonel were at hand it would be his part to act. But the commander of the reserve is out of touch with regiment and must decide himself what to do. It is not the custom in this corps to turn down responsibility.

There are several courses of action open to Major Bachfeldt:

First, he can fall back to the ground near Automne Farm where there is a position favorable for defense against the envelopment of the 82d Reserve Infantry now threatened by the French.

Second, he can hold the reserve where it is, sending only a detachment toward Penchard, and keep on trying to establish contact with the regimental commander.

Third, he can attack with his entire battalion to the southeast and seize the line extending from the southeastern edge of the woods at a point due west of Penchard to the small knoll immediately southeast of RJ 117, both inclusive.

Or to attack at once toward Penchard with the entire reserve in order to clear that locality of the enemy.

The first course of action is justified if the regiment and 22d Reserve Division are actually about to be cut off by a wide envelopment of superior forces from the southeast of Penchard. But this is not yet established; consequently to withdraw on the Automne Farm position is an unwarranted abandonment of the mission of regimental reserve.

Favoring the second course of action is the fact that the regimental commander has ordered his reserve to

follow his assault battalions. He expects that in the normal course of events the reserve will comply with these instructions until it receives its next orders, which will probably be to enter the action. And doubtless the regimental commander is conducting the fight on the basis that he knows exactly where the reserve is, and has but to give the order to engage it where he wishes. Under these conditions the absence of the reserve on a mission of its own may disrupt Colonel von Buttlar's plan with serious consequences.

But opposed to this reasoning are the unmistakable signs that the enemy at Penchard, if not stopped quickly, will outflank the 82d Reserve Infantry. Further advance will not only be impossible then; even withdrawal will be difficult and perhaps impossible. It does not appear that a company or smaller fraction of the battalion can be sure of clearing the eastern portion of the woods and the area about Penchard. More than a mere detachment is needed for that. In fact, the situation is so acute that it seems right to assume that if Colonel von Buttlar were familiar with the situation he would undoubtedly throw his entire reserve in the direction of Penchard to relieve the pressure from that direction. Consequently that is the proper course for Major Bachfeldt to take—to enter the action on the moment with the entire reserve.

The third course of action (which limits the advance of the battalion) would provide protection for the threatened flank of the regiment and would make contact with the 1st Battalion possible. Moreover, it would not prevent a further advance if that becomes desirable. There is less risk in it than in the fourth course, but by contemplating a *resumption* of the attack rather than a continuous vigorous effort, if forfeits surprise. This is bound to make the action far less decisive than the fourth course.

The fourth course carries the offensive action far enough to bring decisive results. But like all decisive maneuvers, it may lead to disaster if the commander's picture of the situation is incorrect.

Thus there is little to choose between the third and fourth courses of action. Both are sound and both meet

the situation. Either one or the other should be adopted immediately.

Major Bachfeldt decides to attack toward Penchard with his whole battalion. A few minutes later he took the town.

Later in the afternoon the two battalions of the corps reserve were brought up. The 32d then advanced to the vicinity of Chauconin and the 82d swept forward to the Neufmontiers-Iverny road.

Such was the situation at nightfall.

HISTORICAL RESULTS

So far we have been regarding this action through the eyes of the German commanders. Some twenty years later we are privileged to dissipate the fog which then surrounded them, call for the records of both contestants, lift the veil, and see what the actual situation was. We can then ascertain what effect these rapid battlefield decisions of the German commanders had, not only on the local situation, but on the general situation as well. Were they correct or did they err? Have they committed their corps in the wrong direction? And what happened when von Buttlar wanted to use his reserve and found it already committed?

Drawing the curtain aside we find:

The French force that caused General von Gronau to attack to the west through Monthyon and Penchard was no small harassing detachment or mere offensive gesture by the garrison of Paris. It was Manoury's Sixth Army moving into position to strike at the flank and rear of the German First Army on the morning of 6 September (the next day). Joffre, the French commander-in-chief, had ordered all the retreating French armies to turn about and attack. It was, moreover, the French Sixth Army

that Joffre counted on as the instrument of victory in this operation known as the Battle of the Marne.

About noon, on 5 September, both the French Sixth Army and von Gronau's IV Reserve Corps had reached approximately their march-objectives for the day. The remainder of von Kluck's army was south of the Marne and going farther south every hour. Von Kluck had not the least inkling of the danger that menaced not only his army, but the entire German right wing.

But this condition did not exist for long, however. General von Gronau's aggressive decision to attack with his entire army corps, even though his troops were tired, revealed the danger from Paris. Von Gronau's IV Reserve Corps plunged into the unknown and met head-on the leading elements of Manoury's army. The French were disposed for a march, not a battle, and could not bring all their forces into the action on the afternoon of the 5th. They had not at all expected to encounter a German advance from the east. And as the day wore on they managed to engage forces somewhat superior in strength to those of von Gronau, but achieved no particular tactical success. At dark the Germans had held their ground everywhere and in places had even made slight advances.

Nevertheless, the French were coming up on both of von Gronau's flanks, and for him to remain on the Monthyon-Penchard battlefield would have been destruction. He withdrew a short distance during the night and took up a defensive position near the intended bivouac areas of 5 September. There he waited the attack of Manoury's army, confident that von Kluck, now warned, would rush to his rescue. The confidence was justified. The German II Corps began marching northward at 2:00 AM, artillery and cavalry trotting ahead. Shortly after 9:00 AM on 6 September, its guns, from the vicinity of Varreddes, were lending a welcome support to the IV Reserve Corps. The French, feeling their way forward, were just launching their attack as the II Corps arrived. Manoury's chance for a decisive tactical success was gone—thanks to the aggressive action of von Gronau.

Even though the Germans eventually lost the battle of the Marne, von Gronau's decision had in all probability prevented a worse disaster. In the German army today, it is considered one of the classic decisions of the World War. But let this be remembered: For von Gronau to have been successful in his daring maneuver, subordinate commanders of great professional ability, possessing courage and initiative, were necessary. Fortunately for him, he had such officers, and no doubt counted on their skill and moral courage in making his decision. And thus he demonstrated his ability to evaluate the impalpable factors of war. A commander without this ability, or lacking subordinates with high initiative, would have run head first into defeat—a defeat serious enough to imperil the First German Army.

In regard to the 82d Reserve Infantry, there is no available information as to Colonel von Buttlar's original plan for the attack to the northwest. It is known, however, that he intended to do so until sudden developments near hill *164* convinced him that such a course was unsound and unwarranted.

His principal source of information was Major Hart whose visit to Colonel von Buttlar's command post was most opportune and whose statements were confirmed by what Colonel von Buttlar could see for himself and by reports from other sources. For the purpose of this problem it has been necessary to improvise the incidents of lesser importance. They are, however, in accord with the picture of the situation as it developed to Colonel von Buttlar.

The decision of Colonel von Buttlar to disregard his orders to attack toward le Plessis-l'Eveque and to attack, instead, to the south and southwest is called by the German Official History "entirely correct." This action checked an enveloping attack by a French Moroccan brigade. (There were no English—the khaki uniforms of the Moroccans had led some Germans to believe they were opposed to British troops.) The Moroccans, without being observed, had moved from Villeroy to Neufmontiers and Chauconin, and were striking at Penchard and hill

164, not only from the west but from the southwest. Five assault battalions were about to take the IV Reserve Corps in flank and rear. What a precarious position for a unit whose officers lacked initiative! But the attack of the German 82d Reserve Infantry struck the Moroccan brigade in flank.

The center and left of the Moroccan advance was stopped but the right continued on to Penchard where it wrought havoc in the trains of the units of the 22d Reserve Division. Again the situation was threatening. Colonel von Buttlar, realizing the seriousness of this threat to his left flank, sent message after message back to his reserve battalion to attack toward Penchard. As we have seen, none of these messages reached Major Bachfeldt. The runners were lost in attempting to pass through the woods which by this time were in the hands of Moroccan snipers.

Major Bachfeldt's attack on his own initiative—exactly what the regimental commander was trying to order him to do—was effective. Penchard was cleared and the threat against the rear of the IV Reserve Corps was removed.

Thus we see that the independent decisions of both the regimental and reserve battalion commanders were just in time to save a bad situation. General von Gronau, Colonel von Buttlar and Major Bachfeldt, each in his sphere, and with the happiest of results, displayed that initiative which in 1914 was a characteristic of German tactical training.

It is probably an exaggeration to say, as some writers have done, that the IV Reserve Corps on 5 September 1914, prolonged the World War for four years. However, it does seem reasonable to think that, considering the size of the units involved, few decisions during the World War were fraught with greater consequences than these.

CHAPTER 8

Leadership

(THE UTILIZATION OF PERSONALITIES)

The word "leadership" crops up often in military conversation. It is used, seemingly, to explain everything that cannot be attributed to intelligence or tactical skill. In fact there is a feeling that there must be something occult about it, and as little time is given to analyzing it as is given to investigating psychic phenomena. Leadership accomplishes this or that prodigious feat, we say; but to the one who asks how this mysterious quality operates, what its principles are, and how it can be cultivated, there is no answer given; unless someone, perhaps, remembering a tag of Napoleonic lore, replies impressively: "Study the great captains of the past. Only in this way can it be learned". But what help is that to a second lieutenant trying to learn how to lead a platoon?

Part of our trouble in understanding this quality is due to the fact that military leadership has several aspects, or is, perhaps, the resultant of several qualities.

One kind of leadership is the ability of a commander to impress his personality on troops as a mass. Do they like him? Can he arouse them to a high pitch of enthusiasm, or fire them with the spirit to accomplish almost impossible tasks? Or is he just another "run of the mine" commander whom the troops may admire, but lacking that subtle something electric in its effect?

All the really great commanders have had this ability to arouse, incite, and direct their troops to the pitch necessary to carry out their plans. Even many lesser military lights have had it. We might call this quality "mass leadership ability".

This phase of leadership has been so little explored that there really is a mystery about it,—a mystery due to lack of study rather than the great difficulty of the subject. What little study has been made would tend to show that the quality is innate and difficult to acquire. Is this true? Since this article does not intend to analyze this factor of leadership because of its wide scope, no attempt will be made to reach a decision here.

Another form leadership takes is skill in judging the personalities of subordinates—not their intelligence—and on the basis of this judgment assigning tasks to them fitted to their personalities. This, it would seem, is the basic leadership quality without which no commander can be successful. Let us call it "human management", for lack of a better term.

In this last skill we can distinguish two separate steps. The first is judging personalities and accurately estimating the slight changes in mood that occur from day to day. This is the difficult part. The second part is the ability, once the personalities have been analyzed, to fit them into a scheme of work, or maneuver, giving to each one the job that fits him best. A mistake can be made in either step. A man who can analyze personalities well is not necessarily good at assigning to them the proper task. Perhaps he does not analyze the tasks well.

To add to this, the mass leader may be deficient in both analysis and assignment of tasks. But anyone who has all three has the makings of a great leader. He needs but one other quality—granted he has military knowledge, moral courage, and faith in himself—to be an outstanding military figure; and that is the ability to judge his opponent as keenly as he judges his subordinates.

This is one of the greatest tests of a general. As Wu the Master said in 600 B. C., in the Book of War, "The secret of war, is first to know who is the enemy's general, and to judge his ability." Napoelon had consummate skill in this respect; and the remark of General Lee that he hated to see McClellan relieved because he knew him so well, is almost too familiar to bear repeating.

But a Great Captain must have still a fourth faculty.

Besides the ability to sense what is in an opponent's mind, he needs to sense what feeling exists in the great "mass mind" of the enemy army. For an opponent—any general—is often forced by the temper of his troops into lines of action he would not otherwise have chosen. Judgment of probable enemy action depends not only on physical facts and what is in the mind of the opposing commander, but on the mood and mental condition of his troops at a particular hour.

Four qualities, then, a commander should seek to develop: mass leadership, human management, the ability to judge an opponent, and the ability to sense what is in the "mass-mind" of the opposing troops. The opportunity to judge the personal qualities of an opponent and to sense what is in the minds of his troops comes only with war. One hardly could expect to do these things in peace. (Nevertheless, the Germans, prior to the World War, laid a foundation for them by including in the archives a pen portrait of every general who might possibly be an opponent.) However, the skill to analyze the "mass-mind" of one's own troops is a good foundation for interpreting the collective reactions of the enemy in war; and studying individual reactions of subordinates is a help in understanding the mentality of an opponent. (Unfortunately, we have not converted to military purposes the great mass of information regarding these four subjects.) But of the four there is one subject, at least, which we can study and actually practice—and that is human management.

In all our map problems, it is true, we deal with hypothetical persons: General "A", Colonel "1st Infantry", or the like. This is inevitable since the object is to teach tactics or technique; and all extraneous factors that might affect or becloud the tactical set-up must therefore be excluded. Actually, in war or peace our subordinates are simple, imperfect humans bearing the quite prosaic names of Jones, Smith, or Brown.

These humans are never alike in personality, and are not interchangeable conceptions like the puppets of a map problem. They differ widely; moreover the mere wearing of the same insignia of rank does not mean that

all individuals so distinguished will carry out all tasks equally well. And this not so much because of difference in intelligence as because of difference in personality. As an abstract statement most people will agree to this but, strangely enough, will continue to conduct their affairs giving it little attention as a practical matter.

"This is an important piece of work," says the commander. "Put a field officer on it." How often such a statement is heard and how clearly it illuminates our mental processes.

The real leader says, "This is a job requiring tact. Put Smith on it"; or "We need a man with force and initiative for this piece of work; assign Jones to it." Here we see the leader analyzing the task and the individual, and fitting one to the other. That is the essence, the very basic foundation, of leadership.

All leaders are like the stonemason who, faced with a jumbled pile of field stone, no two of them alike in any respect, is then to build a wall straight, stout, and true. So must we build with our heterogeneous collection of personalities. But our task is harder; for we must construct a dynamic machine instead of a static wall. And some days our big stones become little, and our little ones big.

Actually no one except the rare mass leader ever commands an organization as big as a battalion or regiment. He merely exercises command over subordinates who in turn direct the destinies of the small units making the whole in much the same way. These smaller units partake of the character of the commander. Napoleon said that there were no poor organizations; only poor commanders. When we know our subordinates thoroughly—better than they know themselves—then we can fit our tasks to them, utilizing their strong points and minimizing their weak ones. Then, and only then, will we know the powers and limitations of our command, and get from it every ounce of power.

Captain Adolph Von Schell in Battle Leadership brings out this point quite well in relating the incident of the German brigadier with the three colonels of contrast-

ing personalities. Colonel "A" does not want an order, he wants to do everything himself, and always does well; Colonel "B" executes every order but has no initiative; and Colonel "C" opposes everything he is told to do and wants to do the contrary—a chronic exception taker. It is to be noted that the strict discipline and high training of the Imperial German army was not able to iron out these personality differences.

Does this keen German general issue orders exactly the same to each? Not at all. To the contrary Colonel "C" he hints that perhaps an attack would be unwise, only to get the reaction that he was looking for, that is, the colonel eagerly requests orders to attack. The brigadier then gives him the orders which, of course, had been previously prepared. To Colonel "A" who does not want orders in detail and who does everything well, the General merely indicates the direction of attack, gives a few coordinating items, and tells him he will bear the burden of the attack. To Colonel "B" who lacks initiative he gives the complete field order. All three regiments attacked splendidly.

This may produce a smile, but it points out a moral, two of them in fact. The first is: If the old Imperial German Army with all its training and discipline, drawn as it was from a homogeneous disciplined people, had to consider the personal factor so meticulously, how much more will we have to consider it in our war-raised armies, derived from a people who, with all their good qualities, certainly do not have the discipline or homogeneity of Imperial Germany. The second is: How skillfully the German general analyzed his leaders! This skill is the very essence of leadership. Any leader with moderate ability and a flexible mind if given the personality decisions reached by the German general would quite probably be able to solve the problem in somewhat the same fashion. In this situation the analysis of the subordinates was the crux of the problem; the rest was simple.

But for all that, the matter is not so simple as to be a mere decision that your subordinates each have fixed personality types—and then using them in every instance

accordingly. Personalities fluctuate within rather wide limits from day to day, though ordinarily like the compass needle they always point one way. But like the compass needle, too, they can be deflected for a time. The commander must be able to judge what will affect them and how great the deflection will be.

For instance it is possible for the stubborn colonel on certain days to be quite malleable. Perhaps an only son has been killed and the consequent depression—the feeling of "what's the use"—numbs him for a time. In such a state of mind, if the general told him that the attack looked risky, he would probably wearily agree. Colonel "A" (who prefers his own way ordinarily) may, under the same conditions, lack his usual dash and initiative and prefer an order. On the other hand such extraneous factors as grief, jealousy of a pretty wife, or even indigestion, might only accentuate particular personality traits. The commander must be able to judge which result will obtain. That takes greater skill by far than the estimate of personality types alone.

"But," the martinet will say, "my subordinates will do as I say, when I say it, and learn to like it. Officers should be able to do things well despite their personal feelings, and above all they should be able to obey orders. This fitting tasks to the personality of a man savors of pampering; at least it is distinctly unmilitary."

Perhaps. But just apply this method to solve the German general's problem. Give to the three colonels the same precise orders in the same way. What happens? Colonel B, lacking initiative, pushes forward dutifully; but one cannot expect anything brilliant of him. Colonel "A," fretted by all the minutiae, cannot do himself justice or thinks he cannot. He feels, too, that the general lacks confidence in him. And he does not feel free to seize on fleeting opportunities that may bring victory. Thus with two of the three out of sorts, the main effort goes slower and slower. And Colonel "C", the stubborn one, goes to his CP filled with dark misgivings and the idea that he faces a hopeless task. This quickly percolates through the staff to subordinate commanders and the troops. There

is no fire to the attack. The result of all this is that the brigade commander finds his attack bogging down and, for the life of him, he does not know why.

Eventually he may get rid of the contrary colonel, who handled right is probably as stubborn a fighter as could be desired; and the one with initiative—he will not be sorry to see him go either because he is too independent of thought. And he will replace both of them with officers more nearly suited to his taste; officers, in fact, who will do exactly as they are told and—unfortunately for any commander—wait until they are told what to do before they make a move.

Thereafter, in all liklihood, he will watch others of less ability and knowledge climb the ladder of promotion while he gnaws his finger-nails. He may call it luck or favoritism as he watches mediocre men rise, but very likely their better handling of personalities will have far more to do with it.

History is replete with commanders who, with incomplete—or even defective—personalities to work with waged war brilliantly. They knew enough not to expect well rounded and perfect men, but took lopsided or even distorted ones as they came, and had the skill to put these together, utilizing the best in each to make a winning combination. Napoleon's marshalate is almost a museum of odd personalities. "True", says the martinet, "but they were all first class fighting men." No; even that is not true. Victor does not fit in that class. And of Berthier, Napoleon said that he would not give him command of 500 men. But he was a wizard with maps; he fitted perfectly in the role of a staff officer. There the Corsican used him as chief of staff. Murat as a semi-independent commander was hopeless, but no one could lead a cavalry charge as he could. There he was used. The study of Napoleon's marshals indicates clearly that it was Napoleon's skillful use of their personalities which played a large part in his success. When he lost his touch in handling personalities it was the marshals who pulled him down.

Longstreet, Lee's able lieutenant, had personality de-

fects for which he has been criticized, and Lee also has borne much criticism for permitting him to retain command. But Longstreet had many splendid qualities that Lee could employ to great advantage. True, he was pugnacious, blunt, obstinate; but he was a fighting general, by and large, because of these very qualities. With Jackson he formed a perfect team which Lee, time and again, drove over the Army of the Potomac. Only when Jackson was killed did the Army of Northern Virginia falter. Lee could not pick another Jackson—such men do not come more than once a century. Longstreet carried on in his same old way and was not replaced, we may be sure, because his equal for Lee's purposes was not to be found in the Confederacy.

On the Union side "Little Phil" Sheridan, firey, impetuous, and daring, had his defects. He was high tempered and sometimes high handed. He was stubborn and belligerent and not easy to handle. In fact we have looked on his defects so much that we have overlooked his virtues. He was skillful in planning, stubborn in holding, and dashing in attack. No one could rally routed troops as he; no one had his drive in pursuit, no one was more idolized by his men.

Put Sheridan and the irascible, peppery, but stubborn fighting Meade together, and one could expect the fur to fly. It did. They rowed continually. Sheridan, once he decided a thing was right, would ride rough shod over the victor of Waterloo, Austerlitz, and Cannae all rolled into one,—if he could. A very difficult man was "Little Phil", and so was Meade with the laurels of Gettysburg still fresh on his brow. Yet with these two imperfect, jarring personalities Grant expected to defeat the wily Lee.

To the one that expects subordinates to be of a more malleable type, the task would look impossible. His first step would be to relieve one or both of command. He would strive to get more tactful and cooperative men in their places. But he would be taking a great risk, for he might get poorer fighting men. This, indeed, should be noted down: Fighting men of the caliber of Meade and Sheridan are hard to find. You may place them as high

or as low as you like in the military Pantheon, but mark this, when the bullets begin to fly such men are priceless. It took the North three years to produce these two, as imperfect as they were.

When Meade finally came to Grant, complaining of Sheridan's actions—they had just had a terrific row in which Sheridan was close to insubordination—, Grant's normal recourse was to relieve one or the other. One must admire that calm, steadfast man as he listened to the complaint—no doubt vitriolic and largely justified.

"So Sheridan wants to gather the cavalry together and ride for Richmond," one fancies him saying. "He is tired of chasing Stuart and wants to force Stuart to gather his forces and meet him in the open, eh? Did Sheridan say that he could lick Stuart and put him out of the way for good?"

Grant puffs on his cigar for a moment, while he reflects and then cocks an eye at Meade and says, "Well why not let him try it"?

Meade, the stubborn, may have been taken aback for the moment; but then Grant was taking the responsibility and Sheridan, once he met the redoubtable Stuart in the field, would probably have some of his cockiness knocked out of him.

So Sheridan rode hell for leather toward Richmond and Stuart gathered his ever-victorious troopers about him in a mass and swooped to meet the threat. The two swiftly moving bodies met at Yellow Tavern. Stuart was killed and thereafter the Union cavalry was ever in the ascendency.

But henceforth the canny Grant kept Meade and Sheridan apart by taking the Union Cavalry corps from under Meade's command. Later in the campaign, Meade, a fighting general, kept hammering at Lee in front, while the quick moving Sheridan pushed, fought, squirmed, and maneuvered on the left flank until he swung his cavalry directly across Lee's retreat at Appomatox, called for the infantry to back him up, and the Civil War was ended. Two men by no means perfect—but how intensely human

—each with sterling qualities Grant needed to win his campaign. And with them he did win it. It might repay us to study Grant's use of personalities. Here may lie the secret of his success, too.

Good men are few. They come in queer and unexpected shapes. Their personalities may irritate the commander and those about him, but those very things which irritate may indicate qualities that are priceless. A man stubborn to his commander may be twice as stubborn before an enemy attack. The driving, forceful character a commander craves in order to give weight to his carefully calculated blows, may, when he is found, lack tact. Men must be taken as nature made them. Military life may modify but can never completely change the individual's character. No one could ever make diplomats out of Meade or Sheridan; nor could anyone make a fighting general out of Burnside.

No one could ever hurry Thomas—"Old Slow-Trot". Yet in war speed is essential. Shall we then discard Thomas? Not if one wishes victories. Thomas might be slow, but in defense he was a giant; and on a stricken field he could hold on with a grip of steel while all was disintegrating around him. Yes, and give him time to get set and he could deliver a staggering blow, as at Nashville. The good leader accepts such individuals as they are and sees to it that his scheme of maneuver utilizes them in accordance with their personalities. Sherman showed how Thomas could be used during the Atlanta campaign when the Rock of Chickamauga became the pivot of the Union advance. A pivot by its very nature does little quick stepping; but it must be solid. If Sherman had not had Thomas, he might have waged his campaign differently. For a workman can only work with the tools he has. Sherman was wise enough to know that.

It would be interesting and instructive to analyze campaigns to ascertain how often brilliant tactical schemes have failed because of the wrong utilization of personalities. Here, for instance, is the critical point demanding a commander with speed, initiative, and a willingness to

accept responsibility if it is to be stormed. But owing to proximity another unit is assigned the task. But this unit has a commander noted only for his ability to make a stubborn defense—a Thomas type. He is miscast and fails. The staff work looks faultless; but the whole scheme falls to pieces, because the commander in charge of all did not evaluate the personal qualities of his subordinates. It is not a difference in intellectual power that is meant here, but a difference in personal characteristics more of the emotions than of the intellect.

In war, then, when we develop our plan we must pay the same full attention to the personalities of our subordinates we do to the terrain over which we are to operate. When the robot of the map problem, "Colonel 1st Infantry" has long since passed away, and in his place stands a human with all the human frailties—and all the latent human heroism; it is that man we must use. See to it that we know him.

To our already lengthy estimate of the situation, then, we must add another paragraph heading, "Personality of commanders involved". This is the unknown quantity "x" in our combat equation. We must solve first for this unknown if we are to expect success.

CHAPTER 9

The Role of the Infantry Tank

*"If we * * * look into the faces of individuals who deal with the horse, and the faces of men who deal with the machine, you will see in the latter what I might almost call a lack of intelligence! * * * I consider the horse has a humanizing effect on men, and the longer we can keep horses for cavalry and artillery, the better it will be for the Army, because thereby you keep up the high standard of intelligence in the man from his association with the horse."*

—General Sir R. G. Egerton (British Army).

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*We have in the last war a passing of great importance to mourn, that of the cavalry. * * * Infantry can be transported by truck faster, more surely, and more cheaply than on horseback.*

We of an older generation, who cling to the horse and its romance with every fibre of our being, may decry this development, but it cannot be overlooked by those responsible for the national defense, for the army is no athletic club.

The cavalry is dead; there is no place for it alongside the tank.

—General Ludwig Ritter von Eimannsberger (Austrian Army, Retired) in Mechanized War.

The modern fighting tank is a myopic, semi-deaf, easily crippled brute that has undergone costly hospitalization and been subject to the treatment of experts which has de-

veloped him from a lazy weakling to an active, quick, and powerful athlete, who nevertheless still retains his near-sightedness, his deafness, and his vulnerability to lightning punches delivered by his unseen adversary. Because of his various shortcomings, he prefers to run on good ground, without a lot of holes to trip him and other obstacles to impede his course; and when he is fighting, he wants to have his opponent where he can see him through his weak eyes without having to grope for him, constantly fearful of catching a punch below the belt before he can get in his own knockout blows.

The manager who signs up a bunch of tanks must bear in mind that they cannot play every position on the team. They should be used as tackles when the ball carriers are coming right along behind them to take advantage of the hole they make in the opponent's line. Moreover, the guards should hit the dirty guys and smother them while the tanks take out the rest of the line. Tanks can even carry the ball through the line themselves, but they only buck well when the rest of the team pushes right along behind them. Sometimes, a whole backfield of tanks can hazard an end run, but it's a risky proposition, to be attempted only when there's everything to gain and little to lose. The team captain should never let the tanks carry the ball in the open field at the kickoff, except when there is no other choice; and then it is wise to have scouts out in front to lead them through the enemy tacklers. Tanks can outrun anything but their own kind, and don't mind light-hitting opponents, however, fast-hitting these may be; but the heavy hitters get under their hide and their only defense against them is to outrun, dodge, or depend on teammates to smother these formidable opponents. As a last resort they charge them from a flank or head-on by zig-zag running.

Furthermore the team captain must determine exactly what he wants the tanks to do, and, during the huddle, be sure that they fully understand the play that is to be made; for the deafness of the tanks, combined with their blindness, makes it almost impossible for him to tell them anything further once the ball is in play. He will have

no chance to give them any commands until they all line up again for the next scrimmage. In the meantime, if the teammates fail to give the tanks adequate support, the captain may have to call the trainer and waterboy and put in a few substitute tanks. On the other hand, if he gives them reasonable support, and uses them right, tanks will be a powerful increment to his or any team, and go far toward carrying it to the goal line and victory.

From the foregoing we can draw up the Ten Commandments governing the use of our present tanks by infantry officers to whom they are assigned. (As a foreword it is frankly admitted that many of these precepts will often have to be disobeyed. There are no infallible rules in war.)

Thou shalt not use infantry tanks—

I. On reconnaissance missions, or against poorly defined resistance. (Light scout tanks or armored cars are needed for this.)

II. Over terrain unsuitable for tanks, or such that they will be unable to make good use of their chief attributes. (Tanks bogged down in Flanders; accomplished little in Chaco jungle.)

III. At night or during other periods of poor visibility. (The tank grows blinder as visibility decreases.)

IV. Against targets that are not suitable for tanks or against which there are other more appropriate weapons available. (This depends on the situation.)

V. When the success of the tanks is not going to be exploited immediately by the other infantry elements. (In offensive combat.)

VI. Without having a well-coordinated plan that includes provisions for supporting and protecting the tanks. (Ye olde team work.)

VII. Without assigning a simple, definite, and limited mission to the tanks. ("In war all things are simple, but the simple is difficult."—Clausewitz.)

VIII. Without arrangements for regaining control by designating an assembly point where the tanks will rally

after accomplishing their mission. (We hope.)

IX. Without allowing the tank personnel an opportunity to see the ground over which they are to attack. (If possible.)

X. Without taking every possible measure to preserve secrecy and obtain the element of surprise. (C'a va sans dire.)

These commandments on infantry tanks are not a complete code and are not absolute. Circumstances may necessitate their nonobservance. Lacking scout tanks and armored cars, our present types of tanks may have to be used on certain reconnaissance missions; and in delaying actions, tanks will often attack when their action is not to be followed up by foot troops, nor even supported by them. However, the limitations of tanks must be kept in mind and it must be remembered that tanks are a part of the team, not jacks-of-all-trades. Their attributes are high mobility, crew protection, shock action, and heavy firepower. These should be exploited—not frittered away.

With these rudimentary ideas in mind, let us examine what the commander of a regiment or larger force, to whom tanks have been allotted, must do in planning their employment. In the first place he must decide whether to retain the tanks to support the action of his entire command as a unit or whether to reallot them to his subordinate elements. If he distributes them he passes the responsibility to others; if he keeps them he has to fit their action into his own plans. But what difference, it may be asked, does it make who controls the tanks—the higher commander or subordinate commanders—so long as they are properly used? To answer this question we must understand the ways in which tanks function.

Generally speaking, there are two roles in which tanks may operate, as taught in our army; the *supporting role* and the *accompanying role*. Foreign armies employ such terms as *scouting, reconnoitering, close accompanying, supporting, leading,* and *distant action* tanks, and have special tanks with different characteristics to perform the

different missions. Space restricts us to a definition of our own terms only.

Supporting tanks are those which support the entire action of a regiment or larger force without regard to the boundaries and individual missions of subordinate units. They may render greater assistance to one subordinate unit than to another—as, by supporting the main attack—but they are not definitely committed nor restricted to a particular zone of action. Their action is usually more extensive, and often goes deeper into enemy territory, than that of accompanying tanks. Supporting tanks usually comprise a group larger than a platoon, such as a company or battalion of tanks.

Accompanying tanks, on the other hand, usually operate in groups of a platoon each. The platoons are ordinarily attached to infantry battalions to render close support to their action. A platoon of accompanying tanks confines its action to the zone of the unit to which it is attached, except for such maneuver outside of that zone as may be necessary to avoid obstacles; it is given shorter missions and more limited objectives; it maintains close contact and assists the unit to advance from one objective to the next.

When a commander reallots the tanks given to him; as, for example, when the regimental commander attaches a tank company by platoons to his battalions, he takes the hammers from his chest of combat implements and loans them to his subordinates to pound down the resistance in their several zones of action. He relinquishes control of his trump cards. Whether he should disperse this power by distribution, or hold it intact to support the command as a whole, depends "on the situation"—more specifically, from the tank viewpoint, on the scheme of maneuver, the terrain, the enemy dispositions, the time factor, and—particularly—hostile antitank measures.

It can be seen that no hard and fast rules can be laid down covering the method of employing tanks. There are, however, certain general situations—other things being equal—wherein the supporting role is preferable.

These are when: the need to reduce definite initial re-

sistance is seen but the further use of tanks is problematical; the enemy situation is obscure; a powerful attack must be made against a decisive point or to considerable depth; boundaries would hinder the tank operation; tanks are to be held in reserve initially; a special mission is contemplated; an obstacle restricts tank action; higher authority limits tank action; the situation demands immediate commitment; and when tanks are used in defense and retrograde movements.

Conversely, the accompanying role (attachment of platoons to battalions) is preferable when: the tanks are needed in several battalion zones; the terrain is suitable in all zones; no concerted action is demanded; a limited objective attack is to be made; the front is stabilized; other tanks are operating as leading, general-support tanks.

Whatever the role of the tanks, the commander employing them has certain obligations to the tank unit commander.

1. He must give him warning orders or make known to him the scheme of maneuver or plan of attack, and what he wants the tanks to do, as early as possible in order to permit the tank officer to—

a. Make his reconnaissance and prepare his recommendations for the employment of the tanks, to include method of employment (supporting or accompanying role), assault and assembly positions, routes, formations, specific missions, and supporting fires desired.

b. Acquaint himself and his subordinates, down to include tank commanders (and drivers if practicable), with the terrain, hostile dispositions, obstacles, route to be followed, and plan of attack.

c. Coordinate with appropriate officers on the supporting fires he desires, times to reach certain points, and routes to be followed.

2. He must request and carefully consider the recommendations submitted by the tank officer (who acts as a member of his staff), bearing in mind the limitations al-

ready discussed.

3. He must provide for the highest order of coordination and cooperation between the foot troops, supporting weapons, and the tanks.

4. He should provide, in so far as practicable, the supporting fires desired by the tanks.

5. He should give the tank unit a definite, simple mission with a limited objective.

6. Finally, he should arrange a definite means for control, and give the necessary instructions for the action to be taken when any eventualities that can be foreseen arise.

The tank unit commander, in turn, has certain responsibilities to the commander he is supporting. He is not only the commander of the auxiliary weapon, but also a staff officer or counselor to his superior. In this role he must carefully consider the possible ways of employing tanks with a view to determining how they can best assist the supported unit. After the tank unit commander has submitted his recommendations and received his orders, he must not only carry out the assigned mission, but further, if circumstances permit, he must endeavor to provide close and continuous support to the foot troops. Thus, on reaching a close objective, if he sees that the foot troops are held up, he must return in his tank, either alone or accompanied by one or more of the other tanks, to ascertain the cause. If the arrest of the attack is caused by hostile resistance that can be neutralized or destroyed by the tanks, he must immediately attack it. In such situations, radio may be useful, for the supported commander, by means of his liaison radio set, can apprise the tanks of the difficulty. However accomplished, tanks must coordinate with foot troops, and foot troops with tanks. Coordination must be mutual to insure success, just as "teamwork" has to be perfect to win the game.

Let us return once more to our myopic football team. It will help us understand the formations used to overcome the handicap of limited vision of tanks and the con-

sequent difficulty in leading or controlling group action. Semi-blind football players can readily follow one another in column but their striking power is limited to the strength of the lead man against whatever is in front of him together with the impetus and added drive provided by those in rear. This also applies to tanks in column. On the other hand, in a short line plunge, if the powerful players are in line, each can take out the adversary directly opposing him and the power of the team is distributed in width to secure the maximum effect on the opponents. Hence tanks find the line formation advantageous when making a short plunge where each tank can be assigned a specific target or area. Moreover, tanks in line are less vulnerable to frontal fire than when in column.

Such a line, however, cannot travel successfully, under control, the full length of the field. For a long play that may have to dodge about the field but requires greater striking power to the front and flanks than obtainable from a charge in column, and better control than is afforded by the line, the wedge formation is admirably suited. It is variable from a narrow inverted "V" approximating a column when control is all important to a broad or flat wedge approaching a line when striking power and avoidance of enemy fire are paramount. It is flexible, controllable, powerful.

Out of these three formations grow echelon, line of section columns, column of sections (where one section follows several hundred yards in rear), and the corresponding formations of larger units.

Whatever the formation, intervals and distances between tanks within a platoon are rarely less than 50 yards or greater than 100 yards. Between platoons they may vary from 100 to 500 yards (or more); and between companies, from 200 to 1000 yards.

When tanks are in a huddle—that is, in assault, assembly (rallying), or reserve positions—they adopt a formation giving them all around protection and permitting them to move forward rapidly. For this the wedge or a fan-shaped formation, or the "laager" are suitable.

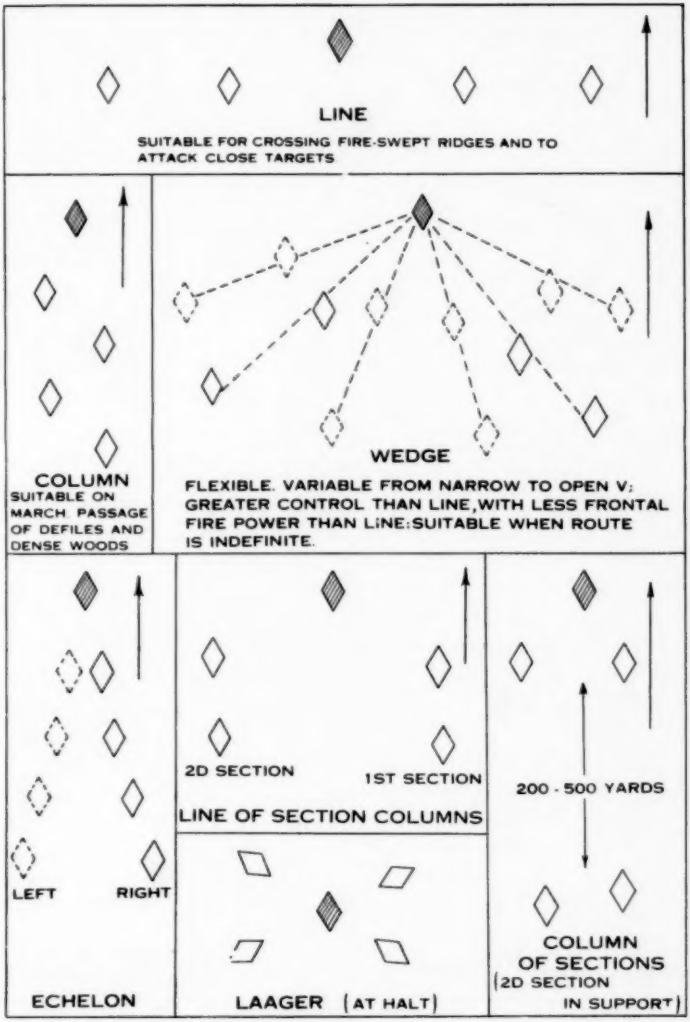
LINE
SUITABLE FOR CROSSING FIRE-SWEPT RIDGES AND TO ATTACK CLOSE TARGETS
COLUMN
SUITABLE ON MARCH. PASSAGE OF DEFILES AND DENSE WOODS
WEDGE
FLEXIBLE. VARIABLE FROM NARROW TO OPEN V; GREATER CONTROL THAN LINE, WITH LESS FRONTAL FIRE POWER THAN LINE; SUITABLE WHEN ROUTE IS INDEFINITE.
LEFT
RIGHT
ECHELON
2D SECTION
1ST SECTION
LINE OF SECTION COLUMNS
LAAGER (AT HALT)
200 - 500 YARDS
COLUMN OF SECTIONS
(2D SECTION IN SUPPORT)

FIGURE 14.—Formations of Five-Tank Platoon.

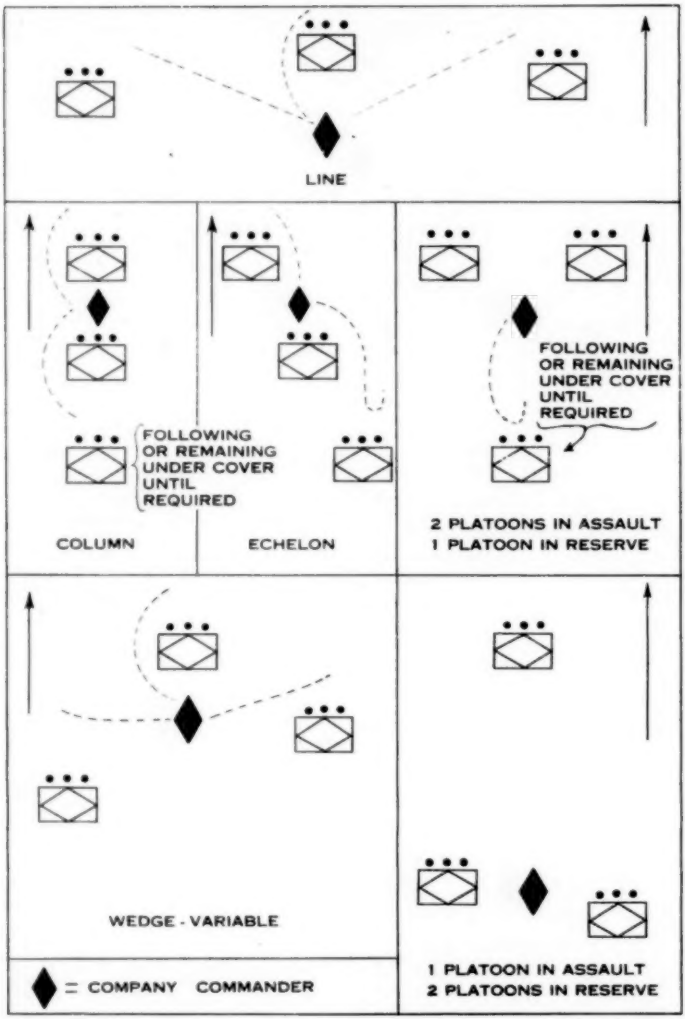

FIGURE 15.—Formations of Three-Platoon Tank Company. (Each platoon normally in wedge formation.)

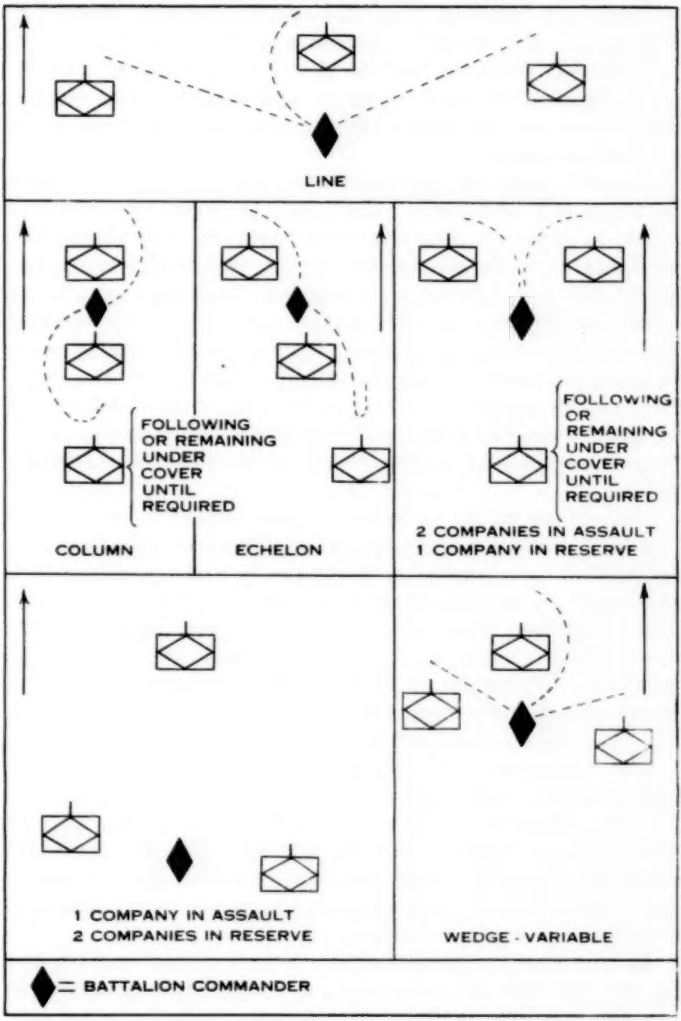

FIGURE 16.—Formation of Three-Combat-Company Tank Battalion. (Each company normally in wedge formation.)

Thus are evolved the platoon formations shown in Figure 14, the company formations shown in Figure 15, and the battalion formations shown in Figure 16. In the formations of the tank company and battalion, the platoon formations are not shown inasmuch as they vary according to circumstances.

Assault positions are selected where defilade and concealment are obtained. They may be from two hundred yards to three or four thousand yards in rear of the line of departure; the nearer, the better, provided secrecy and safety are not sacrificed. Assembly (rallying) points are generally selected in the nearest defiladed and concealed area in rear of the objective. An alternate assembly point is also designated, which is the rallying point for the tanks in case the attack is unsuccessful. If no alternate point is designated, the last previously occupied assembly point or assault position is considered as the alternate assembly point.

The choice of the formation used, whatever the size of the unit, must be based on a consideration of the needs for width, i.e., frontal striking power; and depth, which gives greater control, flexibility, and continuity of power. The formation must also present a poor target to the enemy. Obviously a compromise must be struck and flexibility insured to meet changing conditions. The formation used and recommendations for assault and assembly positions are the problem of the tank unit commander.

The supported unit commander, after conferring with the tank unit commander and considering his recommendations, determines *when* and *where* the tanks will be used, assigns them a definite mission, specifies their assault and assembly positions, and provides for the necessary support and coordination, together with arrangements for regaining control.

In this way the tanks become a part of the team, a cog in the machine, an increment of the whole,—powerful in combination, but of little value alone.

CHAPTER 10

Tomorrow's Tanks Attack

On 9 June in 1938, The Blue 1st Infantry*, supported by the 1st Battalion 1st Field Artillery, was attacking north as an interior regiment of the 1st Division in the first offensive against the great Red invasion. On this day the regiment had its 1st and 2d Battalions in assault and the 3d Battalion in reserve. The regiment had made steady gains during the morning but early in the afternoon Red resistance stiffened and held. By 4:00 PM Colonel 1st Infantry was wondering what to do next. With most of his staff, his 3d Battalion commander, and his artillery liaison officer, he was at the regimental OP trying to think fast, but getting nowhere even faster. Turning to his S-3 he said, for the third time in half an hour, "Go over the situation as it stands now, Major."

"No change, Colonel," replied Major S-3. "The 1st and 2d Battalions are still held up along the line: woods 5—RJ 620—intersection of left boundary with stream south of woods 6. Here it is on the map. (See Figure 17 in back pocket of book.) Our special weapons and artillery can't neutralize the enemy's machine-gun fire." S-3 went on, pointing out the location of each unit. "The 4th Battalion (special weapons), less a machine-gun company and a mortar platoon, is supporting from this hill (*A*). Company K (caliber 0.30 machine guns) and the 1st Platoon of the Mortar Company are attached to the

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*Infantry regiments at that time had four battalions, three rifle battalions and one special weapons battalion. (See Chapter 1.)

1st Battalion, operating from woods 5. The 3d Battalion is still in woods 1."

"The regiments on our right and left are in about the same fix we are. That fire from up there on hills *B* and *C* is holding them up, too—besides the enemy weapons they're up against in their own zones."

"Must be dozens of machine guns up there," muttered the colonel; "How about the 1st Battalion?"

"It put in its reserve company at 3:30 PM. We gave it all the artillery support we had, but when it tried to penetrate up the draw toward *C* as its objective, those Red machine guns stopped it cold."

"I'll say they did," said the colonel. "I hope I never see anything like it again. That open area in front of woods 5 is a regular hell. Damn little of the two right companies even got back to the woods."

S-3 went on, trying to keep his voice matter-of-fact as he recounted the day's failures: "Well, they're trying to reorganize those two companies in woods 5 now. The left assault company of the 1st Battalion is hanging onto its gains. It's fully deployed along the ditches of Le Cisne Road near RJ 620. It's getting such heavy fire it can't move either forward or back. All the 2d Battalion is in now; it's pinned to the ground, too."

"Yes, it's shot its bolt like the others," the CO growled. Then, turning to his intelligence officer, "Well, S-2, have you got anything that'll cheer us up a little better than that?"

"I'm afraid not, Colonel," replied S-2. "It looks as if there must be two enemy battalions on hills *B* and *C*, and at least a battalion of artillery in support. We know the Reds have new 20-mm antitank guns on self-propelled mounts. One of them was seen in woods 8. They probably have about six of 'em in this zone. None of their tankettes have been seen, but they're probably in reserve. The 1st Battalion saw some barbed wire entanglements along the edge of woods 7 and 8. And there's undoubtedly wire in woods 6 also. I've plotted on this map all the known and suspected machine-gun and antitank gun positions and also the combat group locations as well as we've

been able to determine them. We haven't taken a single prisoner." (See Figure 17 in back pocket.)

"The volume of fire indicates that there are a good many more automatic weapons than we've spotted," concluded S-2 lamely.

The colonel grunted, looked at the map for a few seconds more as if there must be some chance for success on it that he had missed, swore a little, and then said, "Well you two certainly don't paint a rosy picture." There is no let up in the noise of battle to the front, as he tries again to reach a new decision. His left battalion has been stopped dead and his right battalion has just been thrown back in disorder leaving his right flank uncovered. The combined fires of his supporting weapons and artillery have not shaken the enemy. If he puts in his reserve battalion now, won't it be the same thing over again—a storm of small-arms fire all along the line? Half or two-thirds sacrificed and nothing gained? Besides an enemy counterattack seems probable. Artillery fire is increasing on the company at RJ 620 and on the right assault company of the 2d Battalion. Anyway, he can, he hopes, stop a counterattack on his exposed right by using the 3d Battalion for that. So for the moment things are bad enough, but not desperate.

"If I can hold on until dark," the colonel muttered, "we may get some help tonight. At all events, tomorrow is another day."

But suppose the Reds clap down with a mass of artillery fire on his left battalion—God knows it's shaky enough now!—and attack all along the line. This thought stopped the whistle for which he just started to pucker his lips. And then came the horrible news, wrapped in a neat package.

A brigade staff officer came into the OP, saluted, and gave him this message:

"The brigade commander directs that the attack be renewed and hill *C* taken before dark."

Before the colonel could even curse, the staff officer saluted again, and hurried down the hill to his staff car.

"We've known for 20 years that you can't capture machine-guns across open ground," thought the colonel as soon as he could think at all. "In this war I thought somebody would do something about it. But here it is, the same old thin gray line of heroes. Well, maybe they know what they're doing up there in brigade. Just the same, I've a good notion to call 'em up and tell 'em I can do what they've ordered but it won't get 'em anywhere."

Then he remembered that brigade knew just as much as he did about the results of the day's fighting, and decided there was no use to buck the order. "If that hill has to be taken," he reflected further, "it looks as if there was only one way to try it—the same old way."

He turned to the 3d Battalion commander:

"Have your battalion partly deploy in woods 4, and prepare to attack up the right boundary passing through the 1st Battalion in woods 5 and on through 8, 11, 16, and 17, then striking at 15 and hill *D*. Maybe we can turn them out of *C*. S-3, tell brigade what we are going to do, and ask for the cooperation of the 2d Infantry against hill *E* and the spur to the south. It's 4:22. We'll attack at 5:45. The 2d Battalion will attack at the same time, advancing and capturing hill *B*."

"S-2, get the 1st Battalion on the phone and tell them to hold woods 5 until 5:30, and to support the attack of the 3d Battalion which will pass through them along the right boundary at that hour. Tell 'em to make good use of their light machine guns. Tell them also," he adds as S-2 starts to move off, "that those two companies, or what's left of them, will constitute the regimental reserve as soon as the 3d Battalion has launched its attack, and that the company at RJ 620 is to attack due north from its present position and assist the 3d Battalion in taking hill *C*. The mortars and machine guns with the 1st Battalion will pass to the control of the 3d Battalion when it passes through the 1st Battalion.

"Artillery, you have your batteries—say, what's this, another brass hat? Hold up those orders a minute," he shouts, "till we see what this is."

But the officer scrambling up toward the OP had too

many spots of oil on his blouse, and the colonel could see when he came close, too much black grease on one side of his face to belong to anything but a tank unit.

"I'm Captain Vickerloyd, 1st Tank Company, sir. My company has been attached to your regiment to help get hills *C* and *B*. The company is now under cover in the east part of Woods 1."

The colonel grabbed the captain's hand and put his arm around him. "Boy, am I glad to see you! Here's where your tin buggies get a chance to do their stuff, if they can. I sure need something to knock out these . . . . . Red machine guns. They've licked my right assault battalion and right now I'm praying the enemy won't counterattack. My artillery and special weapons have given 'em everything they've got, but it hasn't done much good so far. Well, there's no time to waste, it's 4:25 now, and it'll be dark by 7:30; let's get down to business."

Then, leading the tank captain up where he could see the ground to the front, he pointed out the friendly and hostile dispositions, and briefly told him what had already happened, and the plans he had just begun to put into orders when Captain Tanks arrived. He finished abruptly, saying, "There's our plan. Now tell me this—what have you got back there in woods 1, what can you do with it, and what do you recommend?"

"I have three platoons of light fast tanks, five tanks in each platoon," replied Captain Tanks, "and at present I have three replacement tanks, one of which I use as my own tank.* My tank and the three platoon leaders' tanks have sending-and-receiving radio sets. All the others have receiving sets only. Besides that, each platoon has another two-way set in a half-ton truck for use at infantry command posts as a liaison set."

"Latest stuff, eh?" interjected the colonel.

"Yes, sir. They're plenty fast, too—45 miles an hour; but we rarely go over 20 across country, and 12 or 15 is about the average. They'll cross any stream in this zone.

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*Each tank had a crew of four, and two caliber 0.30 and one caliber 0.50 machine gun.

But that swamp on the left, and woods 6, and the woods up there (pointing to 16, 17, and 18) would be hard going."

"Well, how do you figure on using them?" queried the colonel.

"Well, sir—we can attack by 5:45 easy. That will give my tank commanders enough time to get a look at the ground, and then get their orders. I've already studied the map and have a good idea of the ground and dispositions, but I'd like about fifteen minutes more to study the situation further before I submit my recommendations."

"O.K., I'll see you here in fifteen minutes. Remember this—the 3d Battalion is making the main effort against hill *C*, which is the key to the enemy position. As long as he holds that hill, he's got observation and good fields of fire, and we get nowhere."

The colonel turned to his subordinates and staff, "The attack will go on as tentatively planned. S-2 and S-3, get your messages out. Further orders here in fifteen minutes."

Captain Tanks immediately dispatched his motorcycle messenger to the company, along with the two reconnaissance cars. He sent a message by the motorcyclist to his company executive officer to have the tanks ready to move forward by 5:30; to send the tank commanders forward immediately along the road through woods 3 to its northern edge to meet the platoon commanders there; and to send the 1st Platoon liaison radio set to the regimental OP. Then, with his platoon commanders, he went about 200 yards northeast along the edge of the woods from the regimental OP to get a better view of the ground along the stream line near the right boundary.

There he spread his map on a stump and oriented it. After studying it a minute and scanning the terrain to the north, he said to his leaders: 'There are two favorable routes of attack into the enemy position; one up the draw formed by that wooded ridge on the right boundary and the southeastern spur of hill *C;* the other along the stream line between the spur of hill *C* and this ridge between *A* and *B*. Both of those little terrain corridors are

well covered by machine guns and by antitank guns, too, I guess."

"Yes, the colonel said one had been seen in woods 8; and S-2 had several others indicated as probable on his map," spoke up one of the lieutenants.

"Well," continued the captain, "I'll ask for supporting fires to neutralize the antitank guns. Our job is to clean out the automatic weapons that would stop the main effort. That means attacking all the machine-gun positions in the 3d Battalion's zone of advance. But woods 17 and 18 are out of the question. That cliff up in 17 and those thick woods and big trees make the going too hard in that area. Perhaps the artillery can take care of it."

"How about the machine guns along the draw from woods 5 to 9?", asked another lieutenant. "They'll rake the ground in front of woods 5."

"I know it," said Captain Tanks. "Part of the company must attack from 5 along the northern edge of the stream line up to 9 and then on to 14, at the same time another part hits 8, 10, 11, 12, and 15."

"How about woods 6 and hill *B*, Captain?" asked the junior lieutenant, "Aren't you going to attack them?"

"Hell no!" he snorted, "Ridge *A*—*B* defilades the attack of the 3d Battalion from fire from woods 6, and hill *B* ought to fall if *C* is captured. If it doesn't we can attack it later. It would be foolish to attack it now, and damn hard, too, on account of the swamp on the left and the obstacle of woods 6."

REQUIREMENT

If you were Captain Tanks, what ways of using your tanks—supporting and accompanying—would you consider at this time, now that you know the jobs that need to be done?

OPINIONS OF THE OFFICERS OF THE 1ST TANK COMPANY

"There are several ways we can do our job," said Captain Tanks aloud after reflecting a moment. "As things are I wouldn't even consider giving any tanks to the left battalion; it's only making the holding attack; there's no need to hit hard there and the terrain doesn't favor us. On the other hand, the whole company might be attached to or support the 3d Battalion, making the main effort. What do you all think of that?"

Two of his platoon leaders said "OK," but the third answered "No."

"Why not?" questioned the captain.

"Simply because time's too short to work out the details with that battalion commander," replied Lieutenant 1st Platoon. "That outfit has a lot to do before it can jump off from woods 5 and the bat commander has his hands full with his own problems."

"That's exactly right," rejoined Captain Tanks, "and there are some other good reasons, too."

"Well," he continued, after pausing a moment, "the best plan is for us to operate under regiment as supporting tanks. The situation is vague beyond *B* and *C* and the enemy may counterattack. As supporting tanks the regimental commander can use us anywhere—even with his holding attack, if there happens to be a soft spot over there. Besides, he can coordinate his supporting fires to our action easier."

"No sense in holding us in reserve as things stand," he continued. Best thing is to give 'em all we've got right

ahead of the 3d Battalion attack. That means either an attack with the whole company or with two platoons and one in reserve."

"One ought to be in reserve," said Lieutenant 1st Platoon, "to give depth to the attack and have something to meet unforeseen resistance or anything the initial attack misses."

"No question about that," declared Captain Tanks. "We know already our radios don't work as well in a war as they do in maneuvers. If they fall down, the old man will have a hard job trying to tell us anything after we've shoved off. He couldn't get in touch with us till we got to the assembly point or came back to find out what was holding up the advance of the First Foot. If a couple of machine guns open up after we go by—and a good many of them are likely to be remanned—might be twenty or thirty minutes before we knew anything about it. No question about it," he concluded positively, "one platoon stays in reserve."

"Now, should this second echelon be under the regimental commander or the commander of the main effort?" Captain Tanks looked toward Jones, his junior lieutenant, for an answer.

SECOND REQUIREMENT

You decide for Lieutenant Jones whether the reserve platoon should be attached to the 3d Battalion or held under regimental control.

Jones's ears still felt knocked down from the captain's rebuff to his question about attacking woods 6 and hill *B;* but he managed to splutter, "Well sir, I don't think the 3d Battalion commander should be encumbered with tanks. Besides, my platoon would be removed from the control of regiment if it's attached like that."

Captain Tanks patted his rosy cheeked shavetail on the back and reassured him, "That's a good point. But as for loading down the 3d Battalion commander, your platoon wouldn't participate in the initial attack, so it wouldn't enter into his preliminary problems. But later on he'll be damn glad to have it handy to knock out any jack-in-the-box Reds that start popping with machine guns again. He is in direct touch with developments in the zone of the main effort, right up at the front, and if he has a tank platoon at hand, he can put in in without delay when and where he needs it most."

"That's not all," continued the captain, "the regimental OP and CP are over a thousand yards from woods 5, where the 3d Battalion will launch its attack proper, and more than that from the initial positions. Also, communication is liable to be poor. These factors would make it difficult to get the reserve platon into action quickly, if controlled by regiment. Moreover, it's going to be dark soon enough and the regimental CO will be so busy coordinating the whole attack, it'll be far better to have the second echelon up with the 3d Battalion."

Captain Tanks looked at his watch. "Good god! Time's almost up! Here are your missions: The 1st Platoon will attack up the draw north of woods 5, cleaning out 8, 10, 11, and then push on to 12 and 13, then strike 15 and return to the assembly point; 2d Platoon, up the draw from 5 to 9, taking out the guns along the north of the stream line, cleaning out woods 9, and then hitting 14 and returning to the assembly point."

"Where will the assembly point be, Captain?" somebody asked.

"Where do you think it should be?"

"In woods 12," said Lieutenant 1st Platoon. "That's close in rear of the objective, defiladed by the east spur of

the hill, the top of the hill, and the south spur, and it also has overhead cover. It's ideal."

"True enough," admitted the captain. "But the 3d Platoon will need that spot later. And it's too small for all three platoons, especially if the enemy starts to shell it after the 3d Battalion captures *C*. If we were going to push on beyond *C* and *B* it would be O.K., but I doubt if we'll go any farther tonight. I'm going to recommend it as the initial assembly point for the 1st and 2d Platoons, but as soon as the 3d Battalion occupies *C* and the 3d Platoon gets up there, I want you two to pull back into woods 7. I think 7 is better than 9 or 10; it has more defilade. It's better than 8 because it's more centrally located and the platoons can readily move in any direction and are not in danger of a raid from the right flank as they would be in woods 8. The alternate assembly point will be the present position of the company in woods 1.'

"Now for the assault position," continued the captain. "Janakowski, you haven't said much. What's your suggestion on the position from which to attack?"

"The draw in woods 5," answered Lieutenant 2d Platoon. "It gives defilade and concealment, and it's right up in rear of the jump-off line of the 3d Battalion. Our attack and the attack of the 3d Battalion could be coordinated to the minute."

"I suggest our present position in woods 1," contended Lieutenant 1st Platoon."

"What's the matter with moving out from behind the spur of this hill in the woods we are in?" spoke up Jones, "or even from woods 4?"

"Why do you say woods 1, Scott?" asks the Captain. "It's almost 2000 yards from the line of departure."

"Yes, but we can cover that in five minutes at 15 miles an hour. Woods 3 or 4 would be only about two minutes nearer the front. There's already enough in woods 3—what with command posts and the like. Woods 4 has no advantages, and either it or 3 are liable to be shelled by the Reds. It'll take the 3d Battalion at least 25 minutes from the time it leaves woods 4 until it attacks from the north edge of woods 5. If we move up to 5 and wait

there, we will probably be seen and forfeit any chance of surprise and may also catch some shelling. If we jump off from 4 ahead of the 3d Battalion we either have to wait in woods 5 for it to catch up, or else jump off so far ahead of it that the doughboys get very little benefit from our attack. We would only add to the mess in woods 5 if we moved up there, and only interfere with the movement of the 3d Battalion if we moved into woods 4. I don't see any advantage in moving anywhere. By staying where they are until just before H-hour, the tanks gain the advantage of surprise, and also avoid confusion and danger from enemy activity."

"Good," said Captain Tanks. We could time our assault better if we were right up in woods 5 behind the 3d Battalion, but we'd lose surprise. We can only stop for a minute in 5, for the faster we hit 'em the better we'll do. We musn't give the enemy time to take cover or shift his antitank guns around. We can get word from the regimental CP in time to determine the moment we should leave woods 1. If we hear that the 3d Battalion is all set to attack at 5:45—that's the hour now planned—we'll leave woods 1 at 5:40. So be it; I'll recommend the present location of the company as our assault position."

Captain Tanks paused a moment as the tank commanders joined the reconnoitering party. "Take a look at the ground," he told them. "Lieutenant Jones will orient you in a few minutes."

Then, turning back to his company officers: "Now for supporting fires. We've got to have help against the Reds' antitank guns. If the artillery can smoke *B* and *C*, that'll blind their observation posts. I'll ask for artillery, too, or machine-gun and mortar barrages on the antitank-gun and machine-gun positions. That'll be better than smoke; the smoke might blind us when we reach the positions."

"Captain, I'd like to have a few smoke shells on the south edge of 8 for about a minute before H-hour," interposed Lieutenant 1st Platoon. "That'll screen my approach and I can either cut around it—or straight through it, if it hangs over the south edge of the woods. With this six-o'clock wind I don't think the smoke will hurt us any."

"And I'd like the same thing just in front of woods 9," said Lieutenant 2d Platoon, "from about H to H + 3."

"O. K. I'll ask for it, and also a screen between woods 15 and 17." Glancing at his watch the captain cursed and grabbing his map shouted, "Come on Scott and you Janakowski. It's 4:56. We're late already. Jones, point out positions and give the tank commanders the situation. We'll meet you back here after we get the attack order."

The captain and the other two platoon leaders set out at a run for the regimental OP. They got there just in time to hear the colonel bellow, "Where's that damn tanker?" Then, as he caught sight of him, "Hell! I thought you'd deserted us—well what's the dope?"

"I recommend that my 1st and 2d Platoons attack at 5:45 as supporting tanks under regimental control—the 1st Platoon up the draw against woods 8, 10, and 11, then to 12, 13, and 15; the 2d Platoon along the draw northwest from woods 5 against the enemy guns along the north of the draw and in woods 9, then on to woods 14. The 3d Platoon to be attached to the 3d Battalion as a reserve for later use to assist the advance of that battalion. It's only five minutes from woods 1 to woods 5; therefore, I recommend using woods 1 as our assault position in order to get surprise. All platoons will advance from 1 to 5 at 5:40 PM. When they get to 5, the 1st and 2d Platoons will immediately continue on their missions and the 3d Platoon report to the 3d Battalion commander. After they finish their missions the 1st and 2d Platoons will assemble in woods 12 on the alert against counterattacks, and when the 3d Battalion reaches hill *C*, the 1st and 2d Platoons will pull back to woods 7."

"Approved!" cried the colonel. "It sounds good. What do you say to it, Brown?" he asked his 3d Battalion commander.

"What about woods 17 and 18? They're full of guns that will take my outfit in flank."

"I know it," replied the tanker, "but that's a bad area for me to attack, so I'd like to have the artillery block that off with smoke. Now, I'd like some supporting fires,

Colonel. Can I have a couple of minutes to arrange for these?"

"Go ahead. See S-3. But make it snappy. It's 5:05 now. S-3, give him everything you possibly can."

Turning to S-3 Captain Tanks said, "Here's what I'd like to have:

(1) 8 shelled from, say, H — 5 to H + 1; then 10 and 11 from H + 1 to H + 3; then 12 from H + 3 to H + 5;

(2) 9 shelled from about H—3 until H + 5;

(3) 14 shelled from H + 5 to H + 10;

(4) Smoke on *C* and *B* from H — 5 to H + 3; also a curtain of smoke on the south edge of 8 from H — 2 to H + 1; and on the south edge of 9 from H — 2 to H + 3.

(5) Smoke screen from southern point of woods 15 to woods 17 from H + 3 to H + 15."

The smoke and barrages will not only protect my tanks but also the foot troops."

"That's a big order," S-3 replied. "The artillery can't do it all. A lot of that neutralization will have to be done by machine-gun and mortar barrages. That doesn't leave much direct support for the 3d Battalion."

"Damn right it doesn't," broke in the 3d Battalion commander.

"Don't worry, Jack," replied S-3 with a grin, "we'll give you smoke along the west edge of 16 to 18; and the neutralization fires will be just about as useful to you as they are to the tanks." The 3d Battalion commander is still unsatisfied. "I ought to have a powerful artillery concentration on 8 and then successive concentrations or a rolling barrage on up that draw," he complained.

"Oh, yeah. Well, we laid down the best we had for the 1st Battalion when they attacked over that very ground, and they were shot to pieces; and you'd get the same greeting from the Reds. We've got tanks now, and they're going to be your rolling barrage. If we get them past the Red antitank guns you've got some chance of succeeding. If the tanks are knocked out, you're lost too. You have a mortar platoon and a company of machine guns in woods 5 that will be available to help you and also

the 3d Platoon of tanks. We'll give you support when the tanks have got under way."

"I'll watch for you," assured the artillery officer, who has been listening in. "Can you tell me, Captain, when your tanks will reach *C*, 14, and 15?"

"That's a good point," puts in the 4th Battalion commander, "how about the delays—the waits between each leg of your attack?"

"For the 1st Platoon," answers Captain Tanks, "I count on it reaching 8 by H + 2½, 10 and 11 by H + 6, 12 by H + 10, 13 by H + 16, and 15 by H + 21. It should get to the initial assembly point in woods 12 by H + 27."

"That's about the time my leading elements will be clearing woods 10," adds Lieutenant Colonel 3d Battalion.

"The 2d Platoon," continues the tank commander, "should reach 9 by H + 6, and 14 by H + 12. It'll be in the assembly point by H + 20 unless it runs into unforeseen trouble. These assumptions are based on an estimate of 10 miles per hour average speed and a couple of minutes delay at each of the main positions we attack."

"All right, gentlemen," interrupted the colonel, as he finished talking to Lieutenant Colonel 1st Battalion. "Are you all set? S-3, let's see your scheme of fires."

The colonel studied S-3's notes for a minute and then continued, "That appears satisfactory. Get out overlays for the interested officers." Facing the group, he announced, "The attack stands as previously ordered; the 3d Battalion, now in woods 4, passes through the 1st Battalion and, together with the two tank platoons, attacks at 5:45 and captures hills *C* and *D*. The company at RJ 620 assists the 3d Battalion. The 2d Battalion makes the secondary attack and captures hill *B*. No change in administrative details. Keep me informed about the situation. Give 'em everything you've got and move fast. When you reach your objectives organize them for defense. We'll hold hills *B* and *C* tonight. Captain Tanks, report to me as soon as your company gets under way and remain here during the attack. Then I'll have somebody to advise me

close at hand and also a means of controlling the tank action."

"Yes, sir; I'll return as soon as my attack leaves woods 5."

"Are there any other points or questions, gentlemen?"

"Yes, sir," answered the tanker, "There will be two liaison radio sets here at the regimental OP and also two tank platoon sergeants and two runners. The 3d Platoon liaison set will report to the commander of the 3d Battalion."

"And I'd like to get more direct support for my attack than what S-3 has given me," further insisted the commander of the 3d Battalion. "The tanks have got just about everything. Yet I'm supposed to be making the main effort. It doesn't seem to fit into any problem I ever saw."

"Colonel," replied the regimental commander, "we're not giving an illustration in tactics but trying to win a fight. You haven't a Chinaman's chance of crossing that open ground. I just saw it tried and I know. But if I can get the tanks across into those draws to root out the machine guns, you can easily follow. Ergo, the tanks get their needed support. I'm just as interested in your success as you are, and I'll see that you get all the support we can give you. But the tanks come first at the jump-off."

"It's now 5:20," concluded the colonel, "good luck."

The various subordinate commanders saluted and left, and Captain Tanks and his two platoon leaders rejoined Lieutenant 3d Platoon and the tank commanders.

THE ATTACK

At 5:22 PM Captain 1st Tank Company issued his attack order, as he had outlined it to the colonel at the OP. He directed Lieutenant 3d Platoon to report to the commander of the 3d Battalion as soon as the company reached woods 5. At 5:30 they moved back to the waiting tanks in their reconnaissance cars and each went to his regular post. The company was already in column, each

platoon in wedge formation, crews at their posts, and motors running. At 5:38 word was received that the 3d Battalion had entered woods 5 and would be ready to attack at 5:45 PM.

Captain Tanks ordered the 1st and 2d Platoons to move out in column, still keeping their wedge formation. He followed the 2d Platoon after signalling the 3d Platoon to follow him. On reaching woods 5, Captain Tanks signalled "Disregard my movements", and parking his tank in a little draw, dismounted and went to the forward edge of 5 to watch the initial progress of his platoons.

Lieutenant 3d Platoon put his tanks in a covered position and reported to Lieutenant Colonel 3d Battalion.

The 1st and 2d Platoons pushed out of the concealment of the woods, opened fire, and advanced on their first targets. As the captain watched he could hear the din of the supporting fires. He thought he could notice a considerable decrease in the hostile fires—probably the result of friendly artillery, machine-gun, and mortars pounding them.

The leading elements of the 3d Battalion, attacking in column of companies, advanced to Le Cisne Road.

From the northern edge of the woods Captain Tanks saw both of his platoons reach their targets intact, and with machine guns spitting fire, move on toward the next targets. Both platoons had opened out into a flat wedge formation with about a hundred yards between tanks in the 1st Platoon and seventy-five between those of the 2d Platoon. Seeing that all was going well, the captain hurried to his own tank and went back to the regimental OP.

Putting his tank behind the nose in rear of the OP he joined the colonel to watch the rest of the attack. Riflemen could be seen on the north of Le Cisne Road. A few small groups had almost reached woods 8. Four tanks of the 1st Platoon were visible on hill *C*. Through his field glasses Captain Tanks saw one tank just south of woods 10. It was not moving.

"One casualty," he sighed inwardly. Beyond woods 9 the 2d Platoon disappeared into woods 14. Only four

tanks. One gone there, too. Yes, there it is sitting deserted just south of woods 9.

A few minutes later the colonel cried: "There goes your 3d platoon!"

Over on the right flank, Captain Tanks saw the 3d Platoon charge across the open field between 5 and Le Cisne Road, cross the road, then the stream bed, and then circle east of 8 and attack woods 11. Men were rushing in small groups from Le Cisne Road toward the east end of woods 8. Then others came in sight moving out of the northern edge of woods 8.

"They've pushed more guns down into woods 11," muttered the colonel.

"Well, whatever there was in woods 11, the 3d Platoon seems to have silenced it," rejoined the captain. He could see riflemen enter woods 11 and others advance in thin lines between 8 and 10.

A soldier came up and handed the tank officer a message. He read it, turned to the colonel and said, "Here's a radio from my 1st Platoon. It says: 'First Platoon now leaving woods 15 for assembly point. Mission accomplished. One tank lost south of woods 10. Area lousy with machine guns. Believe we got most of them.' Well, I'm g'ad the 3d Battalion has that other platoon. They'll probably need it."

"I'll say they will," ejaculated the colonel, "Look at that coming down Le Cisne road from the 2d Infantry zone. Tankettes*!

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*These tankettes were ultra light tanks, often termed machine-gun carriers, similar to those used in England, Russia, and many other armies, notably for reconnaissance and security as well as for attack missions. It is also used to haul a trailer. Different types weigh from 1.5 tons to 3 tons. The Carden Loyd Mark VI weighs 1.8 tons, carries a crew of two with one machine gun. (Special types carry a caliber 0.50 machine gun, a 47-mm gun, or a mortar.) This vehicle has a maximum speed of 30 m.p.h.

Ten tankettes came from the northeast down the draw along the Le Cisne Road. Two stopped abruptly. The 2d Infantry antitank guns must have scored. Shortly, the caliber 0.50 machine guns of the 4th Battalion barked their warning. But the range was too long and the eight remaining vehicles swung up the draw towards woods 10.

"Radio," shouted Captain Tanks. "Call 3d Platoon—2350—tell 'em enemy tankettes are moving up draw to woods 10."

"I hope they've already seen them, Colonel," he said, turning back to the regimental commander. "All the 3d Platoon has to do is take positions in woods 11 and knock them off as they pass in review."

"Yes, and that's what they are doing," confirmed the colonel as he saw two more tankettes stop. The others went out of view behind woods 7.

"I hope they get them all," the colonel muttered. "Ah! there's your 2d Platoon, I guess, going into woods 12. Wonder why we haven't heard from it?"

"Its radio is probably out, Colonel." Turning to a messenger Captain Tanks said, "Find out if any word has come from the 2d Platoon." A moment later the runner came back with a report from the radio operator of the 2d Platoon liaison set that he had heard the platoon leader's orders to his tanks until 5:58; then no more.

The 3d Tank Platoon could now be seen withdrawing from woods 11 around the east of woods 8 and into the draw between 7 and 8.

"From the action of that 3d Platoon, it looks like they had cleaned out woods 11," said Captain Tanks. "The commander of the 3d Battalion is using his head. He's getting them back under his control ready for another punch if he needs 'em."

A few minutes later a telephone call to the colonel came from the 3d Battalion: "One company is advancing from woods 10 to the top of hill *C;* another is in woods 11, and the reserve is just entering the south edge of woods 10. The accompanying tank platoon is in the western end of woods 10. Enemy tankettes are all knocked out and captured except one that succeeded in escaping up the draw;

30 prisoners en route to the regimental CP; about 25 casualties in the 3d Battalion."

The colonel turned from the telephone, "They're going good, thanks to your help, Captain."

Through his field glasses he scanned hill *C*. "There goes one company into 12. Now if they can just hang on!—"

He was interrupted by a messenger who ran up waving a slip of paper, "Message from the 1st Platoon, sir."

The tank company commander read it aloud: "First Platoon attacking around north side of 15 to strike flank and rear of counterattack now coming through woods 15."

"Fine! Fine!" said the colonel, chuckling as he lit a cigar. "That's a wide-awake lieutenant you have, Captain."

A few minutes later they saw four tanks cross from 12 to 13 and then emerge from 13 and move toward 14.

"That must be the 2d Platoon after another enemy group," said the captain.

"Exactly," the colonel agreed. There goes some of B Company between 9 and 13. Must have been held up by fire from 14. We've got 'em going, son." He clapped the tanker on the back.

Presently, the 3d Platoon of tanks scrambled up the side of hill *C* from 10 to 12, followed by what looked like a whole company of the 3d Battalion.

The colonel turned to Captain Tanks, put his cigar in the corner of his mouth and, cocking his tin hat over one eye, saluted with a flourish. "They're on the run, and your outfit did it. I've got just one little job now, which I think you can do. Go up there and grab one or both of those supporting platoons and take a whirl around the far side of *B*, and come down along the edge of 6. Clean out the resistance that's still holding up the 2d Battalion. They'll probably run when they see you coming. Can you do it?"

"Yes, sir. Where do you want me to go then?"

"Come on back here. I may have more for you to do by then."

Captain Tanks ran to his tank, told the driver where to go, and what was to be done, and climbed in. His tank

streaked down the Champagne Road, cut off at RJ 620, crossed the stream line, and headed toward woods 13. As soon as he sighted the 2d Platoon returning from woods 14, Captain Tanks hoisted his signal flag to signal "Do as I do", and cut over toward the northern end of hill *B*. The platoon, by now reduced to three tanks, turned and followed in wedge formation.

Circling hill *B* counterclockwise, the platoon opened fire on the clump of trees at CR 628 and the little wood just southeast of CR 628.

Captain Tanks ordered "Echelon right" by radio, and followed the edge of woods 6, cutting into the woods wherever he could to crush enemy positions and guns still in place. On reaching the bay in the south end of the woods, he turned his tank toward hill *A* and returned to the regimental OP.

Colonel 1st Infantry grabbed him as he jumped out of his tank to shake his hand. "Boy, you did it," he cried, "look out there." Captain Tanks looked. He saw the 2d Battalion elements moving fast up hill *B*, apparently unopposed. They were nearing the top.

"I've just had word from the 3d Battalion," continued the colonel. "The 3d Battalion has two companies on hill *C* and one on *D*. Outposts are in woods 14. The 3d Battalion is digging in. Hill *C* is being shelled but not very effectively. Your 1st Platoon is now in woods 7; the 3d Platoon is in woods 12. Now, sit down and have a cigar. You've done your stuff for today, I think. And you've sure sold me on tanks. Damned if I wouldn't like to annex your company permanently. I'll take back what I said about tin buggies. Men alone can't destroy the power of modern defense; it takes tanks to break down enemy resistance and open the way. And what a difference in the number of our casualties! We lost about two hundred men killed and wounded up to 4:00 o'clock and accomplished nothing. I'll bet we haven't lost a quarter that many since then, and look what we've done."

"What a day this has been! Let's go back to the CP and get the dope from the adjacent units and all the details of our own situation. Maybe there's a drink back

there—hot coffee, anyway. I need something after this scrap."

As the shadows fell, the colonel strode down the hill with the tanker at his side.

EPILOGUE

It may seem that the use of tanks in this situation was unorthodox. Indeed, other methods of employment might have been equally effective. The situation and mission demanded, however, that a powerful blow be struck with the least possible delay. This blow could be delivered best by striking swiftly against the enemy areas that were preventing or threatening to prevent the advance of the foot troops making the main effort. The defense of *C* had to be neutralized. The maneuver of the 1st and 2d Tank Platoons, if not blocked by antitank guns, bid fair to do this. A more circuitous maneuver might have taken the enemy positions in flank, but would have run the risk of failure by its complexity and the dangers of operating in unknown terrain.

A reserve is desirable in every situation of war. The 3d Platoon, held out initially, partly fulfilled this precautionary step. In order, however, that its strength might be employed rapidly, and that the main effort might have a mailed fist with which to strike when it needed help, the reserve was given to the 3d Battalion.

CHAPTER 11

Lines and Formations

Tradition, and the habit of centuries, are what make us confuse drill-ground terms with those of the battlefield. But since most of the words in the language we speak have more than one meaning, it requires no unusual effort to learn occasionally two meanings for military terms whose accuracy of import is vital. At least until we adopt an unmistakably clear terminology, discarding words that have long since reached their military nonage, we must do the best we can with what we have.

In discussion of modern tactics it is often said that we must "get away from 'lines' ". The word nevertheless continues in our talk, refusing to go the way of less fundamental words now obsolete. But let us see what a line really is.

To Alexander, Caesar, and Frederick the Great—and even to most generals of the World War—a line was this—

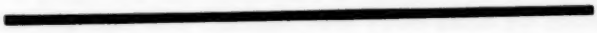

FIGURE 18.

And now, when we put lines on maps to show deployed troops, we often make them like this—

FIGURE 19.

When as a matter of fact we mean something of this kind—

FIGURE 20.

These are all "lines". The first one—straight—is, of course, a drill field line. It is not an exaggeration to say that it has no place whatever in modern battle. The second, however, is simply a convention for the third, a convention we often carry even farther. For example, this—

FIGURE 21.

means roughly this—

FIGURE 22.

in other words, it simply means the front border of a disposition of troops which is considerably dispersed in depth.

So; whenever we speak of lines it behooves us to know precisely whereof we speak.

Another word, a close parallel to "line" in its military usage, is "formation". This word, too, has both a drill ground and battle sense. And our minds need to be just as clear regarding its meaning when we use it.

"Formation"—the battle word—implies offensive combat. Units never adhere, however, to a particular "formation" in the parade ground sense, during any part of their deployment or attack. This is true from the first partial deployment until the battle is won, lost, or drawn. Numerous variations and degrees of deployment are necessary, but nothing of drill ground precision enters into them.

We speak of attacking "in column", and mean simply that the elements of a unit are thrown into battle successively. How easy it is, though, to picture the column formation of the attack as something of this kind—

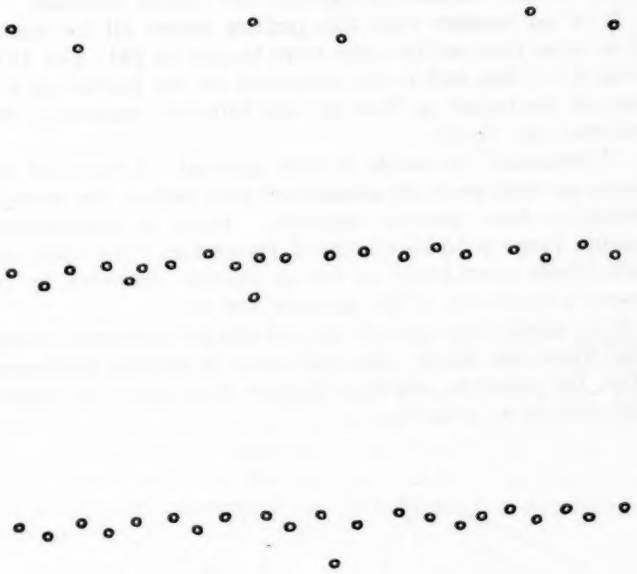

FIGURE 23.

gallant waves of men at five-pace intervals moving forward to hurl themselves against the hostile defenses.

It is no wonder that this picture arises all too easily. It is what four million men were taught in 1917 and 1918. And it is what had to be unlearned on the battlefield at a cost of thousands of lives by our infantry regiments that reached the front.

"Formation" in battle is only general. Lines and columns as such must be abandoned well before the enemy's defensive fires become vigorous. Even in approaching combat there is no regularity of formation, since units and individuals must avoid as far as possible detection by the enemy's observers of the ground and air.

It is hardly too much to say of the formations in battle that there are simply the equivalent of orderly confusion. This, for example, shows a typical disposition of a small unit during an attack—

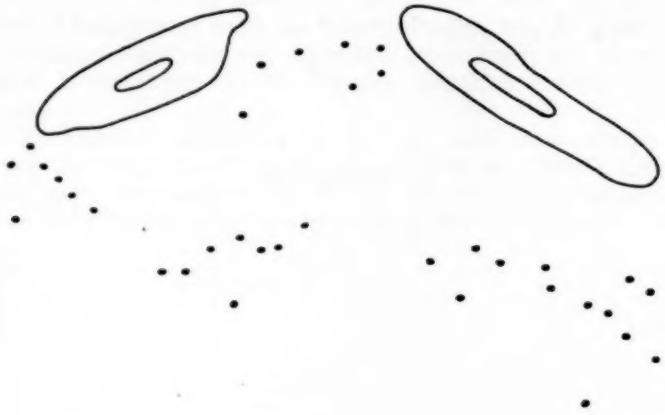

FIGURE 24.

This is simply a representation of six eight-men squads engaged in an attack in the direction shown by the arrow. Behind them are other squads not shown which are not likely to be so apparently scattered, perhaps, but which form no more of a "formation" or "line" than these do. If the reader will turn the page he will see what kind of a line is required to connect the individuals and squads pictured above.

FIGURE 25.

It is not much of a line in the parade ground sense. And fifteen minutes later in the battle it is likely to have an entirely different shape, but one just as crooked. Whether we use the new infantry organization described in Chapter 1, or the old, the same thing is true.

The various controlled dispositions of the squad, section and platoon—and even those of larger units to a great degree—have as their primary end, not precision but the utmost flexibility consistent with control. For it is only through flexibility and elasticity that units can take full advantage of the ground over which they advance and fight. There is no chance of a successful attack against a defending enemy unless fire and ground can be effectively combined.

Moreover, ground so devoid of irregularity that infantry attacking across it could keep in accurate line if they tried, is undoubtedly—short of utterly impassable ground—the worst terrain possible on which to attack. In modern warfare, level ground is made impassable, to all intents and purposes, by the bullets of the enemy.

Thus in the attack (and in the defense as well) no infantry leader of troops parallels his drill field activities; and both "formation" and "line" mean utterly different things. Instead, a leader handles his unit, however small it may be, as a movable, flexible maneuver element, fitting its actions to the ground of the battlefield and the action of the enemy. Platoons, sections, and squads all operate in this manner, continuing to do so even when actual leadership becomes temporarily impossible.

Combat would be more inspiring, perhaps, if all leaders could move about observing the progress of their units, encouraging men, and continually giving new orders. Indeed, they now do this as much as possible. But in the usual case, once a leader has decided upon, and told his men, what his scheme of action is, he can only exercise control at intervals thereafter. By the time an attack begins and the enemy's defensive fires are fully active, his elements then become so separated, by the maneuver necessary in using and gaining ground, that only an intermittent leadership is possible.

And far more often than not, at any given moment in the course of an attack, the dispositions of a small unit of infantry would be unrecognizable as either a "line" or a "formation".

CHAPTER 12

Infantry Antiaircraft Tactics

INTRODUCTION

A definite doctrine on infantry antiaircraft tactics has been needed since attack aviation first became active during the World War. A new subject, affecting in its measures every infantry unit and individual, it has required careful thought and development. This chapter contains in concise form the present teachings of The Infantry School on all aspects of infantry antiaircraft except the technique of antiaircraft training and firing. New work in these two subjects is now being completed and will appear in later volumes and in Basic Field Manuals. The material embodied in the present chapter, with possible modifications, is also soon to appear in an official text.

Of particular interest in the light of the present chapter are articles that have been published in previous volumes of The Mailing List. The historical basis of all infantry antiaircraft development was contained in Volume VII, Chapter VII, Can We Shoot Down the Low-flying Attack Plane, which traces the casualties to airplanes from infantry fire since the first plane was shot down in 1911. In Volume IX, Chapter VI, Planes and Bullets; Chapter VII, Foreign Thought on the Low-flying Attack; and Chapter IX, Infantry vs. Air Attacks (Historical problems) also treat the same subject.

INFANTRY ANTIAIRCRAFT TACTICS

Antiaircraft defense of infantry troops is based upon

concealment, dispersion such that a remunerative target is not offered to enemy air forces, and defensive fires.

CONCEALMENT

The advantages of concealment as a defensive measure are obvious. A knowledge of the location of the target is a primary consideration to attacking hostile air units. The enemy planes can only carry a limited amount of machine-gun ammunition and bombs. Consequently, they must place this fire, to get results, upon areas that contain at least a certain concentration of troops. They cannot afford to spread their attack over large areas, most or all of which may be unoccupied, on the mere chance of doing some damage; nor can large numbers of enemy planes be dispersed and fly over terrain seeking targets if large numbers of pursuit aviation are available to oppose them.

In this regard, it is also evident that terrain in general varies from flat open plains without tree or bush to extensive thickly forested areas. Whole German army corps remained hidden from French aerial observation in the great Ardennes Forest in 1914; whereas, in the campaign against the Riffs of 1925-26, only caves and rocks afforded shelter from attacking French planes, in the barren mountains of the desert.

It should be noted, however, that in operations of large ground forces the amount of concealment available in average terrain (chiefly in woods and villages), as compared to the amount of personnel and material that it is necessary to conceal in daylight hours, forces the utilization of all available cover to a distance in rear of the actual front much greater than heretofore contemplated. This is to a great extent compensated for, it is true, and made possible by motorization. For motorization enables convoys to bring supplies and personnel to the forward areas under cover of darkness, and return to concealed areas far to the rear before day—an extent of operation impossible for animal-drawn transport.

The fact remains that aerial attack is not worth while

to the enemy unless he knows where suitable targets are to be found. The utmost use of concealment consistent with other tactical considerations is the most effective measure for preventing the enemy from gaining this requisite information.

DISPERSION

The fires of the aerial attack are usually fires covering a narrow area rather than fires directed at specific individual targets. Hence the effectiveness of aerial fires varies directly as the density of the troop formations attacked. In order, consequently, to present less remunerative targets, infantry units, both on the march and in bivouac, must adopt formations that minimize the effect of the hostile aerial machine-gun fire and bombs. For it is indeed true that the commander who exposes troops or vehicles in close order formations to air attacks, can expect the same result he could expect from the observed ground fires of artillery or machine guns placed upon such formations.

Greater intervals between individuals, between elements, and between units, and greater distances between units, are desirable when enemy air attack is probable. This dispersion should be the maximum consistent with the accomplishment of the ground mission.

A commander, however, cannot afford to scatter his troops all over the countryside in his zeal to present a poor target to enemy planes. Control of the unit, be it a squad or a brigade, must be maintained at all times. In principle the lateral dispersion should be no greater than the front on which a unit is to be deployed for combat, and the dispersion in depth must not be so great as to make possible the defeat of leading elements by hostile ground troops before the elements in rear can support them.

DEFENSIVE FIRES

Regardless of the protection afforded infantry troops

by antiaircraft fire of coast artillery and by pursuit aviation, the protection of the combatant elements of infantry units, and infantry trains when present, is always a primary responsibility of the infantry commander. Moreover, these combatant elements have sufficient fire power available in their own weapons for an effective fire defense against enemy aircraft. As in any other fire fight, losses are to be expected, but the concentrated fire of infantry's weapons is in turn capable of inflicting heavy losses on the hostile aerial attackers. The immediate result of aerial losses is the reduction of the effect of the attack. A pilot killed, or an engine disabled, means that one element of the attack cannot complete its effort. Continued heavy losses to the enemy air force from ground fire will not only reduce his air power available for attack, but may cause him to cease using planes for that purpose, because his aerial attacks have proven so costly.

AIRCRAFT INFORMATION

Whatever the methods infantry adopts for protection against air attack, timely warning is essential to give the troops a chance to put those measures into effect. The information gathering agencies of GHQ can and will determine the probability of enemy air attacks within the theater of operations. From this source the troops receive the general warning that air attacks may be expected. This general notice of danger is necessary so that troops can take the steps preliminary to further measures of defense. More definite information regarding the activities of hostile attack aviation comes from the information and intelligence services maintained by Army aviation and antiaircraft artillery. Passed on to all troops this information constitutes a further general warning and enables them to be especially watchful against surprise attacks.

In addition to these general warnings broadcasted to all troops, there must also be specific or local warnings of immediately approaching enemy attack planes. This local

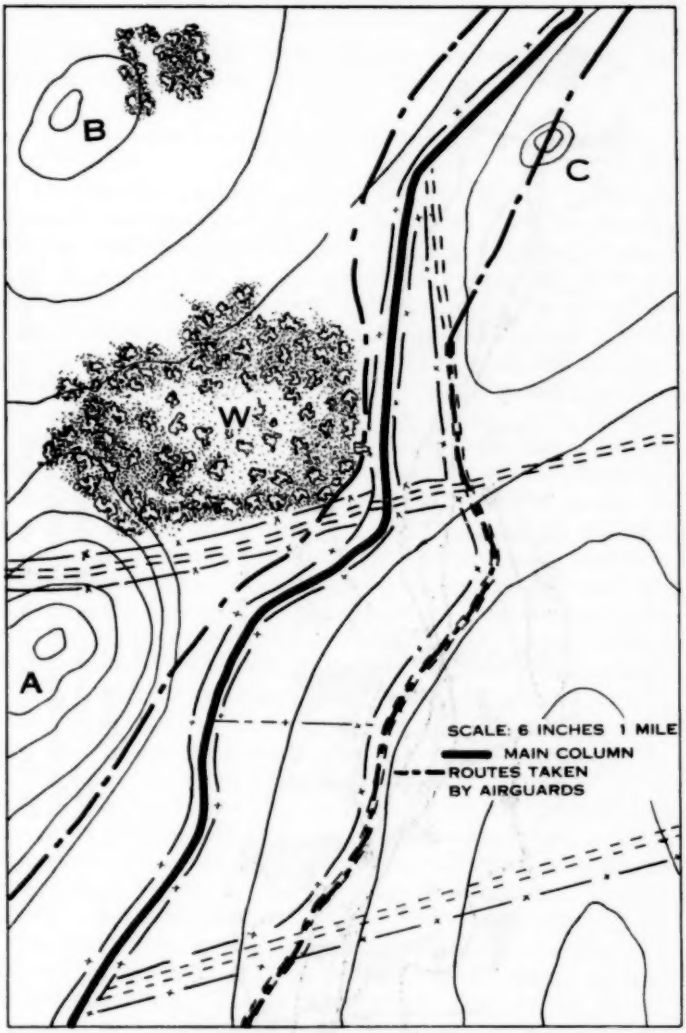

FIGURE 26.—Air guards with a column. On the left hills *A* and *B*, and woods *W* keep the guards close to the column. On the right the more open terrain permits the guards to stay farther out.

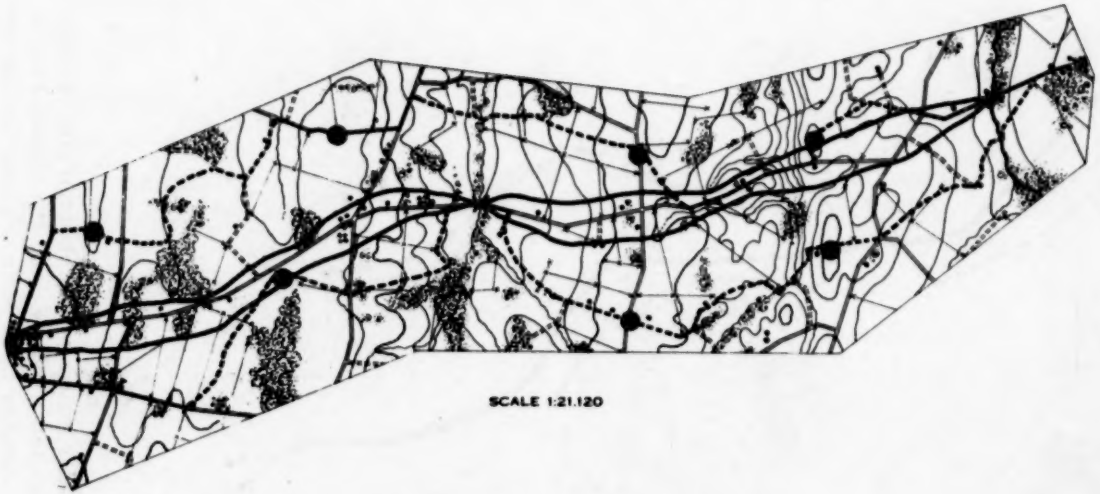

FIGURE 27.—Air-guard routes.
Solid: Dismounted air guards.
Broken: Motorized air guards.
Circles indicate bounds of motorized air guards.

warning may come from friendly planes or from air guards maintained by the troops themselves.

AIR GUARDS

As infantry provides against surprise attack by enemy ground elements, so must it take similar steps to provide against surprise attacks from the air. Every infantry unit is responsible for its own security against such attacks regardless of the security measures taken by higher commanders. Each ground unit establishes air guards whose only duty is to observe for hostile attack aviation. Whether air guards are attached to other security groups or operate with their units forming part of a column, their sole mission at all times must be to observe for air attack. Air guards must be posted to cover the front, rear, and flanks of a unit whether it is on the march, in assembly areas, or in bivouac. (See Figures 26, 27, 28.)

Air guards must be particularly alert in cloudy weather, especially when the clouds are low enough to hide the approach of a hostile air attack. They must be on guard for air attacks coming out of the sun, from behind nearby hills or woods, and from other likely avenues of approach.

Air guard duty is very tiring because the guards must unceasingly observe toward the sun, sky, nearby hills, etc. For this reason air guards operate in pairs, each man observing for not more than 15 minutes at a time.

It is highly undesirable to keep an entire command on the alert for signals from air guards. Therefore, special air guard observers are detailed from within units to watch and listen for signals from air guards. No observer should be expected to watch or listen for signals from more than one air guard. Frequently the nearness of air guards will make unnecessary the detail of air-guard observers. At all times when other duties do not prevent, all leaders keep on the alert for possible air attacks.

When the terrain favors it, air guards should march across country or on roads paralleling the march of the column. (Figures 26 and 27.) (In the usual case this

will not be practicable but it is the ideal sought.) They should be out as far as possible consistent with being seen or heard by the air-guard observers with the column. In unfavorable terrain they may move by bounds from one good observation point to another, by motor, or mounted,

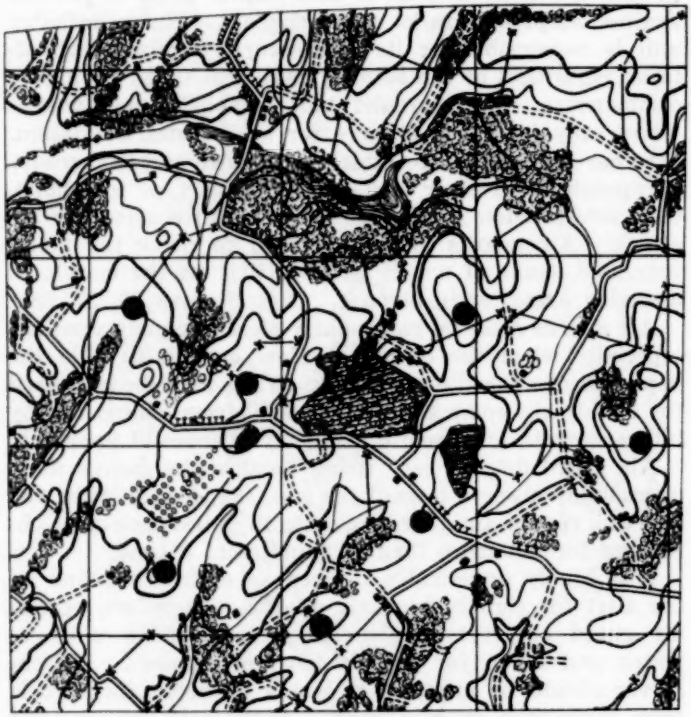

FIGURE 28.—Antiaircraft guards around a bivouac area.

if possible. (See Figure 27.) Frequently, however, the terrain will prevent their movement at any distance from the column. When this is the case, they endeavor to keep at least far enough from the column to avoid the noise of the marching troops. Such close-in air guards are posted

even when distant air guards are used, because they may hear approaching planes and give the alarm before the distant air guards can do so.

Air guards around a bivouac are stationed well out from the bivouac, and on commanding terrain wherever possible. (See Figure 28.) The establishment of air guards should be coordinated by higher authority where many small bivouacs are in one general area.

WARNING METHODS

In the general case, attacking planes are not heard or seen until they are within 10 to 20 second's flight of an observer. The altitude of flight is very low and the speed of approach great—about 1000 yards per 10 seconds. Consequently the time between the first detection of the approach and the attack is exceedingly short, and any warning the troops get in time for it to be of value must not only be given immediately, but immediately received and unmistakeable in its purport. The method used must transmit the warning from air guard to air-guard observer almost simultaneously with the air guard's first glimpse or sound of the approaching planes. The air-guard observer must then give the attack signal instantly to his unit in order to give them every possible second to take their defensive measures.

Although various means, such as bugle calls, rockets, Very pistol signals, electric horns, and radios, have been used experimentally to transmit warnings both from air guards to air-guard observers, and from the latter to the troops, no standard means has yet been adopted. The development of a portable radio-phone set as a means of transmitting information from air guards to air-guard observers may soon be realized. An efficient instrument of this kind would permit air guards to operate at greater distances from the column than any other means of giving the alarm. A siren or horn is also under consideration.

Until a suitable instrument of warning becomes standard equipment, the best means at hand must be employed. Signal projectors can be used by air guards, and bugles,

whistles, or the voice, by air-guard observers. Inadequate means of alarm, of course, limit the distance that air guards can operate from the marching troops and still be seen or heard.

Contact planes equipped with suitable means of signalling ground troops should be used, whenever available, to augment the work of infantry air guards. The presence of contact planes, however, does not relieve infantry units of providing their own security measures.

IDENTIFICATION OF ENEMY PLANES

With both friendly and enemy aircraft in the air, the question of prompt recognition of hostile airplanes, and particularly the early recognition of enemy attack formations, becomes very important. Columns on the march must not be harassed and delayed by having to deploy or seek cover preparatory to firing every time an airplane comes in sight, however distant. Moreover, hostile air forces are liable to attempt causing such delays by threat as well as by attack. Such continued delays may well prevent a column of troops from reaching its objective within the required time. Therefore, as far as possible, troops must only halt to deliver fire when a hostile attack is actually threatened. To attack ground targets effectively, planes must fly low and close to the troops attacked, although they may attack by dropping bombs from higher altitudes. The difference between an approaching air attack and other forms of aerial activity is considerable. Air guards and observers must be trained to know the difference so that false alarms will be kept at a minimum. (See Figure 29.)

Furthermore, training in airplane identification should be general throughout the infantry, and air guards and observers should be especially trained to recognize readily the types of planes used by the enemy. Markings and the outline appearance of hostile plane types form the best means of identification training, although markings are frequently camouflaged or absent from combat planes. (The silhouette targets used in antiaircraft rifle and ma-

chine-gun training should always be designed in the shapes of planes used by the enemy.) Figure 30 shows types of

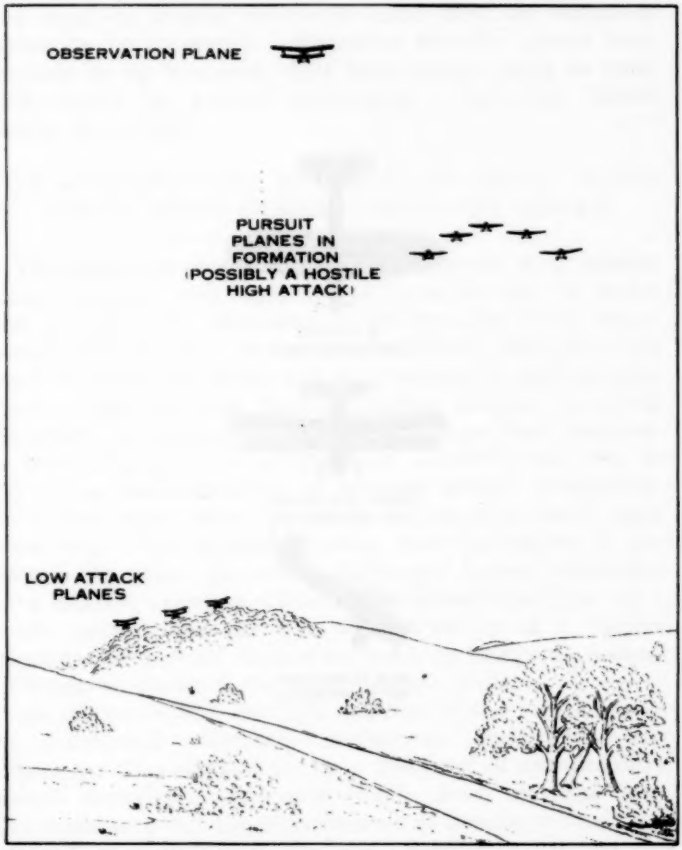

FIGURE 29.—Difference in appearance of attack planes and other types.

silhouettes. The speed of airplanes is so great, however, that their actions will be the only way of recognizing planes as hostile, in most instances. In the World War

FIGURE 30.—Airplane silhouettes.

many friendly planes were shot at, and not a few were actually shot down by the fire of their own ground troops. Low-flying planes not readily identified as friendly aviation must be treated as hostile until they are definitely known to be otherwise. Whenever friendly planes have occasion to fly low over their own troops, units in their path should be warned beforehand. Such low flights should be avoided.

THE ANTIAIRCRAFT DEFENSE OF TROOP MOVEMENTS MADE DURING DAYLIGHT HOURS

The statement has frequently been made that modern attack aviation will force troops to move only at night, and by day only when fog or smoke hides their movements from the air. It has also been held, admitting that some daylight movement will be unavoidable, that all daytime movements must be made across country in widely dispersed formations. Undoubtedly, troops must frequently move during hours of good air visibility, not only in rear areas but sometimes in forward areas. Frequently, also, they must move on roads in order to reach their objectives. The tactical situation and the nature of the terrain, in many instances, limits the lateral dispersion to a narrow frontage little if any wider than that of a route column, and prevents the elongation of a column beyond normal road distances based on troops in column of fours with normal distances between units.

At the same time, daylight marches of the future should be considered emergency movements undertaken only where the time element is vital. The limit of cross-country march distance is ordinarily small. Such marches, also, are made to avoid the effectiveness of hostile ground fires as well as those from the air. Road marches, on the other hand, are of indeterminate distance, or distances comparable to the present day's march of foot troops.

All movements of troops and their trains can be classified under a few general headings as follows:

(1) Marches along roads.
(2) Marches across country.
(3) Movements by motor transportation (including movements of trains).
(4) Movements by rail.

We shall consider each of these in turn in the ensuing paragraphs.

MARCHES ALONG ROADS

The danger to ground troops from attack aviation is greatest when troops are forced by limited time, a poor road net, terrain preventing cross-country movement, and other tactical considerations, to make a daylight march along a well-defined road in formations comparable in length to the present route columns of fours. At times such marches have to be made by units as large as a division. Retiring columns pressed by an energetic enemy must march day and night if they are to escape the pursuing forces. The Turkish columns retreating before Allenby in 1918 were continually harassed by British planes, especially on the more important roads.

On the other side of the picture, pursuing forces ordinarily use roads if they are to inflict the maximum damage on the defeated forces. In the spring drive of 1918, for example, German reserves hastening forward by main routes to exploit the victory were subjected to the attacks of every fighting plane the Allies could spare for the purpose. The Allies' margin of success in finally stemming the German tide was so slight that the effect of these aerial attacks is held by numerous military historians to have been the decisive element. Again, a serious situation on a corps front, for example, either in defense or attack, may compel the movement of corps reserves for distances greater than can be made by a cross-country march if they are to reach the scene of their contemplated use in time. The Germans, in turn, during the 1918 break-through used planes by the hundreds against Allied reserve units. Losses from the antiaircraft fire of

troops were so great that, in view of their limited aerial reserves, they had to stop this use of planes.

SMALL COLUMNS

Small columns, such as battalions, and under some conditions regiments, can march along roads in comparative safety using chiefly negative measures. Such columns are not ordinarily important enough as targets to warrant an aerial attack. Nevertheless, when the road space is available, small columns should be marched in column of sections in single file on each side of the road, with distances between platoons of 50 or 75 paces. If attacked the troops quickly seek cover off the road and open fire on the hostile planes. This type of march formation is, however, suitable only for small units.

LARGE UNITS

When larger bodies of troops, brigades and divisions, march along roads, the following conditions will usually obtain:

(1) A rate of march of approximately 2½ miles per hour.

(2) Halts, or delays, reduced to the minimum.

(3) The length of the marching column approximately that of close order formations.

(4) A greater distance of march than is practicable across country.

(5) Adequate control over the marching columns.

Under these conditions such a column cannot be permitted to leave the road at every sound of an airplane, or it would never complete its march. It must halt, seek cover, and prepare to fire only when a definite attack threat exists. Protection is secured primarily by positive action—the delivery of the maximum infantry fire against the attacking planes. Concealment, cover, and dispersion must be secondary to the fire defense. Only by the infliction of losses can the effects of hostile air attacks be

reduced and increased safety for future columns be gained.

Certain negative measures, however, are also desirable and can be taken prior to the march. Given a choice of several roads, the road should be selected that affords the most concealment to a column marching on it. Main highways, other suitable highways being available, should be avoided for troop movements when time and the tactical situation permit. A road with frequent curves, moreover, devoid of long straight stretches, is better than a relatively straight road, even though it may be a few miles longer and has steeper grades. (See Figures 31 and 32.) And, of course, maximum dispersion throughout the column consistent with the conditions of march, is always a desirable and necessary measure of antiaircraft defense.

These negative measures having been taken before the march begins, a suitable formation from which defensive fires can be delivered against hostile planes, becomes the primary consideration. Figures 27 and 28 show a suitable march formation for an infantry battalion as part of a larger force, marching under the conditions outlined above. A rigid application of this formation to all marching situations cannot be expected. It is, however, applicable to general road conditions and tactical requirements. Figures 33 and 34 show a battalion with animal-drawn transportation. Troops are in single file on each side of the road on the pavement. When it is practicable they march on the shoulders or on paths paralleling the road. If the battalion is partly motorized, the motors may move by bounds as described below. The machine-gun company headquarters marches with battalion headquarters. One machine-gun platoon is attached to each rifle company and marches with it. If a howitzer platoon is attached to the battalion, it marches in rear and in similar formation. (See Figure 35.) If a caliber 0.50 machine-gun platoon (antitank) is attached, one gun (and cart or truck) is attached to each rifle company and one to battalion headquarters company. Other vehicles of the combat trains that the tactical situation requires to be with the battalion, are distributed throughout the column.

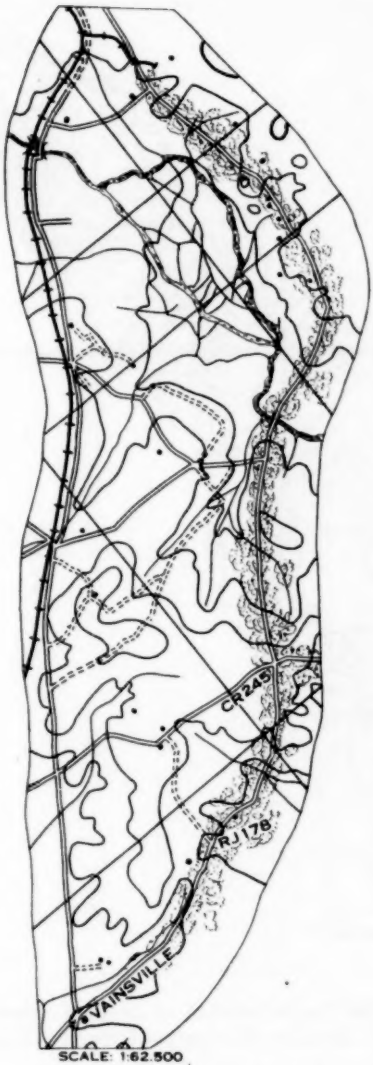

FIGURE 31.—The road: Vainsville—RJ 178—CR 245—thence north, has better cover than the roughly parallel road leading directly north out of Vainsville.

FIGURE 32.—The route market *A* is preferable to the direct route: Belair—Hickory—Gibson—Kalmia.

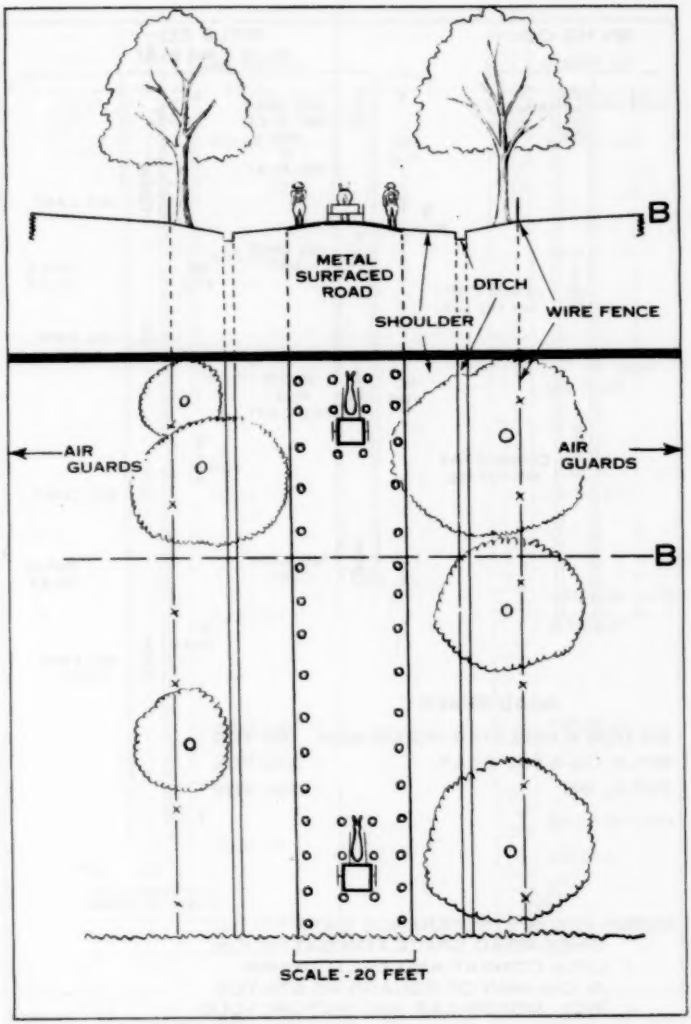

FIGURE 33.—Antiaircraft march formation.

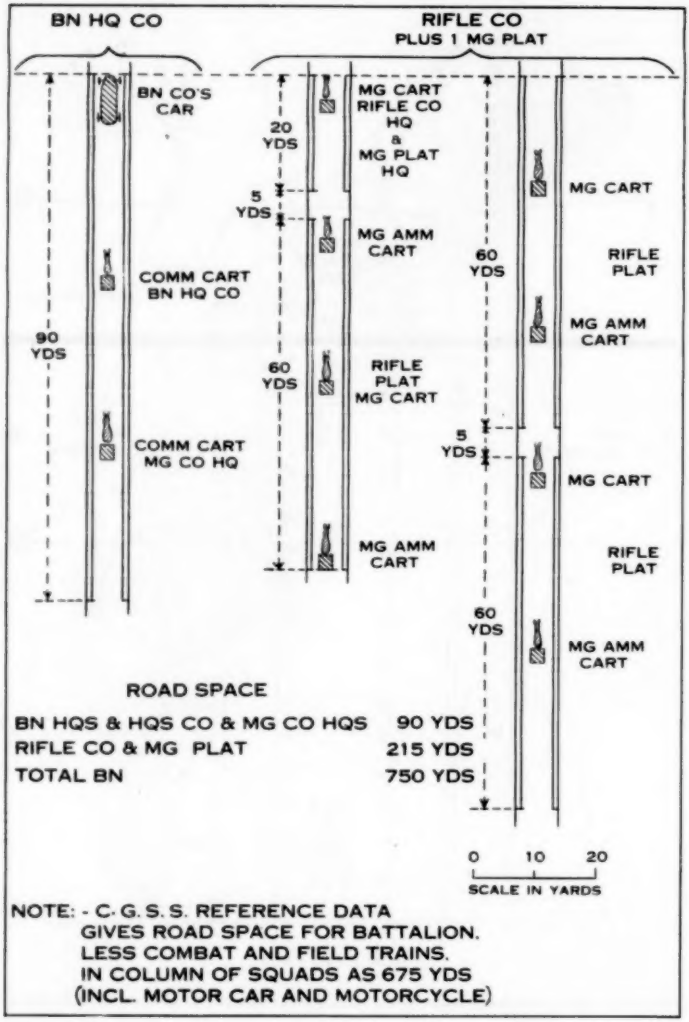

FIGURE 34.—Antiaircraft march formation.

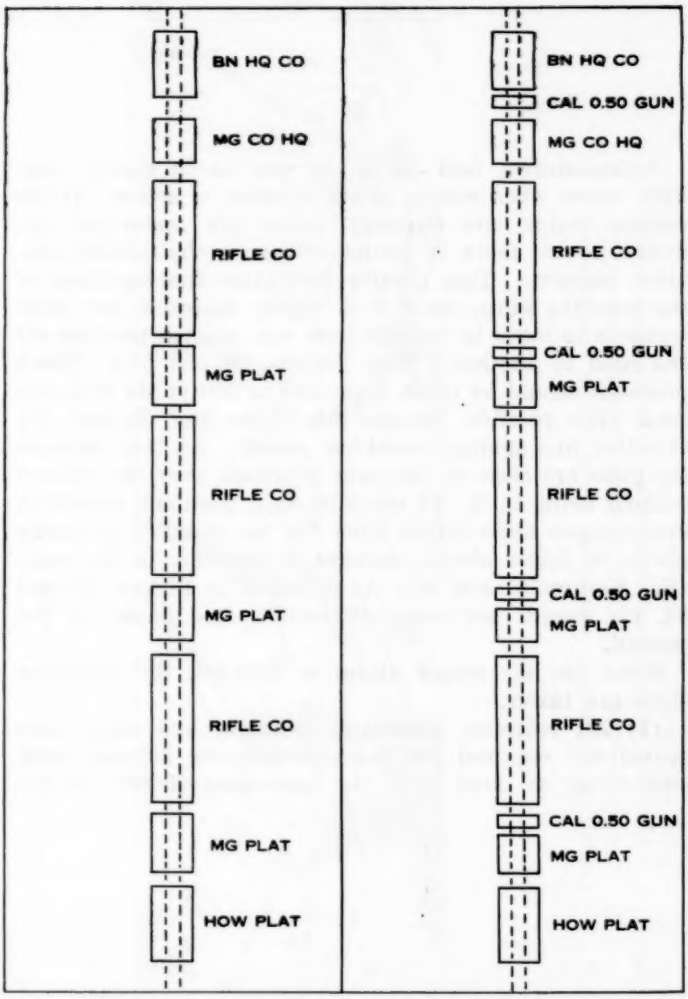

FIGURE 35.—Diagram showing the order of march of an infantry battalion, with machine-gun units motorized. (Not to scale.)
Left: Without caliber 0.50 guns.
Right: With caliber 0.50 guns.

Animal-drawn field trains do not march during daylight hours when enemy attack aviation is active. If the combat trains and company trains are motorized, the motors should move by bounds whenever the tactical situation permits. This greatly facilitates the handling of the machine guns, since it is highly desirable for these weapons to move by bounds from one selected position off the road to another. (See Figures 36 and 37.) These positions should be taken from 100 to 200 yards from the road when possible, because this is the best distance for effective fire against attacking planes. At this distance the guns are close to the path of attack over the column without being in it. In selecting such positions motorized machine-gun units should allow for the inability of hostile planes to follow abrupt changes of direction in the road. (See Figures 51 and 52.) As indicated in Figures 33 and 34, air guards are some distance to the flanks of the column.

When the air attack alarm is sounded, the following steps are taken:

(1) All riflemen, automatic riflemen, and other personnel not required for machine guns or animals, seek such cover as there is in the immediate vicinity of the

FIGURE 36.—Possible motorized machine-gun positions in open country. The positions shown might not all be occupied at the same time; and those positions would be occupied in succession.

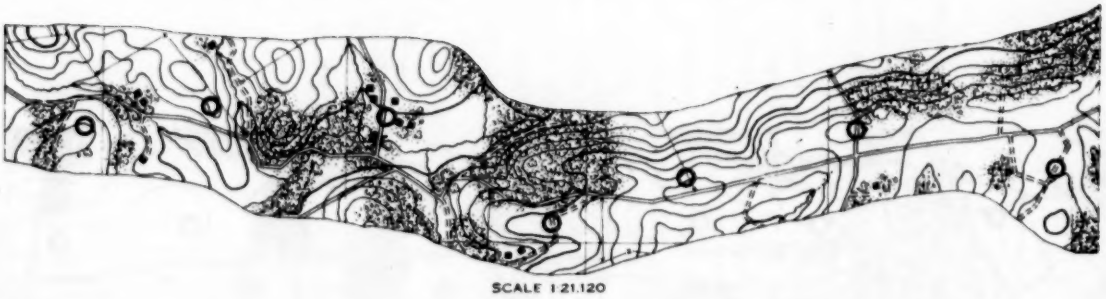

FIGURE 37.—Possible motorized machine-gun positions for the defense of a marching column in hilly broken country. The positions shown would not all be occupied at the same time, and those used would be occupied in succession while the unit was marching on the road shown.

road, and open fire on the attacking planes. (See Figures 38 to 40.) The ditches or banks of the road offer some cover, as do gullies, small depressions, trees, walls, and the like. Deployment should not take place very far to the sides of the road. The time between the alarm and the moment when fire should be opened by every

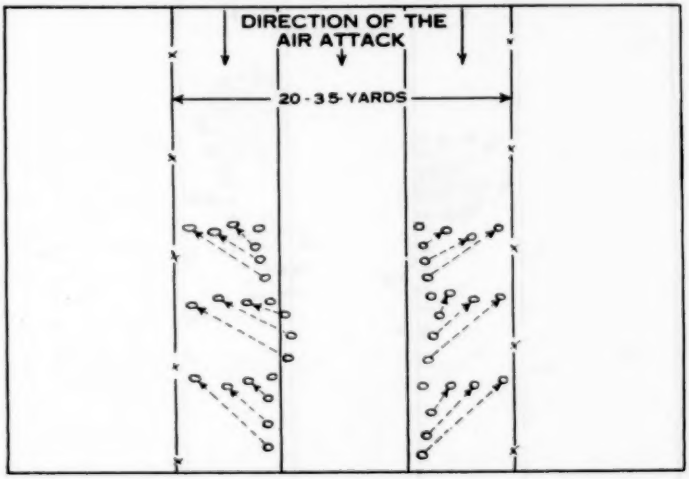

FIGURE 38.—A rifle section deploying on a limited width to fire at a low-flight attack. The trees force some men into the road in order to fire.

available weapon is ordinarily only a few seconds. Troops should be impressed with the fact that there is not time enough to run clear of the attack and that a maximum of fire is their chief defense against such attacks. The fire of a single rifle can bring down a plane. (See Figure 41.) The fire of a thousand rifles, automatic rifles, pistols, and machine guns directed accurately toward low-flying planes, even for the few seconds of firing time available, no matter what their rate of speed, is almost certain to strike every plane in a hostile attack and cause

some of them to crash or come to the ground in forced landing.

(2) Animals are moved off the road and tied to trees, fences, or telegraph poles, if the time permits and there

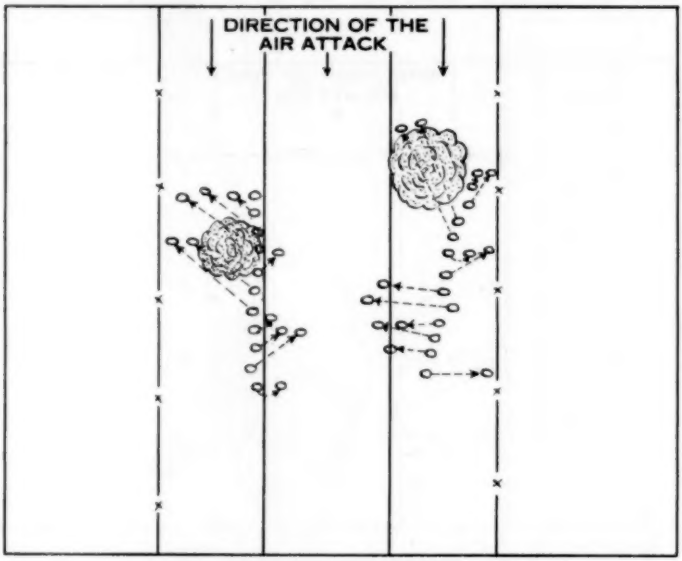

FIGURE 39.—A rifle section deploying on a limited width to fire at a low-flight attack. As far as possible the road itself is left open for machine-gun fire. The same kind of deployment is used in the case of an attack from the rear. If the attack comes from a flank, men simply face in the direction of attack.

are objects to which they can be tied. In many cases the animals will have to be held on the road. In all cases, every effort must be made to prevent runaway animals with the resultant confusion and injuries.

(3) Machine-gun trailers are detached from the carts, and the guns, which are habitually carried at the half-

load ready for antiaircraft fire, open fire on the attacking planes from positions on the road.

(4) Motors caught in movement are stopped and the occupants seek cover. The vehicle itself may be the best cover available. Fire should be opened by all men possible.

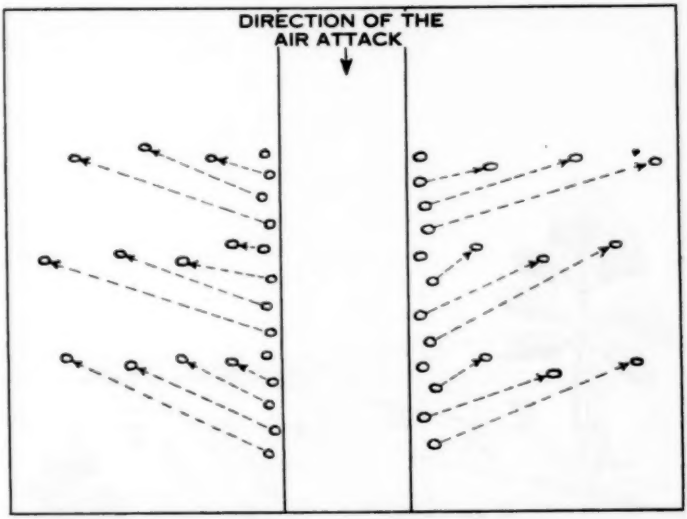

FIGURE 40.—Deployment of a rifle section to meet the air attack, where terrain, fences, etc., do not limit deployment. Troops deploy far enough out to be well uncovered.

(5) All commanders down to include squad leaders supervise the action of their units and are responsible that all men take the prescribed measures for antiaircraft defense in this and in all other circumstances involving air attack.

(6) Once the attack has passed overhead, firing ceases and all men seek cover from the bombs dropped by the attackers. Several seconds remain in which to seek what-

ever cover is near at hand and throw themselves prone. The bombs fall directly under the paths of the planes and also are visible to troops on the ground. Figure 42.)

FIGURE 41.—The attack from the air and infantry fire against it.

(7) After the bombs dropped in the vicinity of a unit have detonated, which does not occur until after the attacking planes have passed overhead, preparation is made to fire at the planes again in case they should circle about and return along the column.

(8) As soon as the danger of further attack has passed, the units reassemble on the road in the antiair-

craft march formation and resume the march as soon as possible. The battalion commander decides when the column should reassemble and directs it to do so. Medical

FIGURE 42.—A plane dropping a parachute bomb. The bomb is plainly visible and takes several seconds to fall 20 or 25 yards. By the time it strikes, the bomb has steadied and hits on its end, where the fuse is.

troops care for the casualties. Motor transportation that will not run, and wagon transportation for which there are no draft animals, must be pushed off the road.

If the enemy attacks by spraying poisonous gases, the action of the troops attacked is initially the same as when

he attacks with bombs and bullets. In fact, the approach of the two types of attack is approximately the same except that gas planes may fly higher and their attack may not be accompanied by machine-gun fire. Once the planes pass overhead, however, it will be evident whether gas or bombs is the medium of attack. If gas is detected, the command: *Gas,* is immediately given and masks are put on. Several seconds are required for sprayed gas to settle to the ground. During this period troops run into the wind if the terrain permits, in order to get out of the gas. (See Figures 43 and 44.) However, if the gas

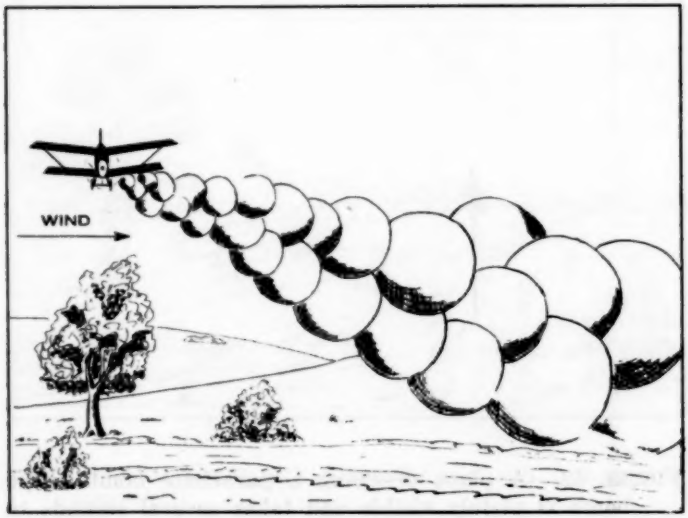

FIGURE 43.—The effect of wind on gas sprayed from an airplane.

planes have passed by more than 50-75 yards upwind from the troops, it is better to run down wind away from the drifting gas, since the gas rapidly becomes thinner in

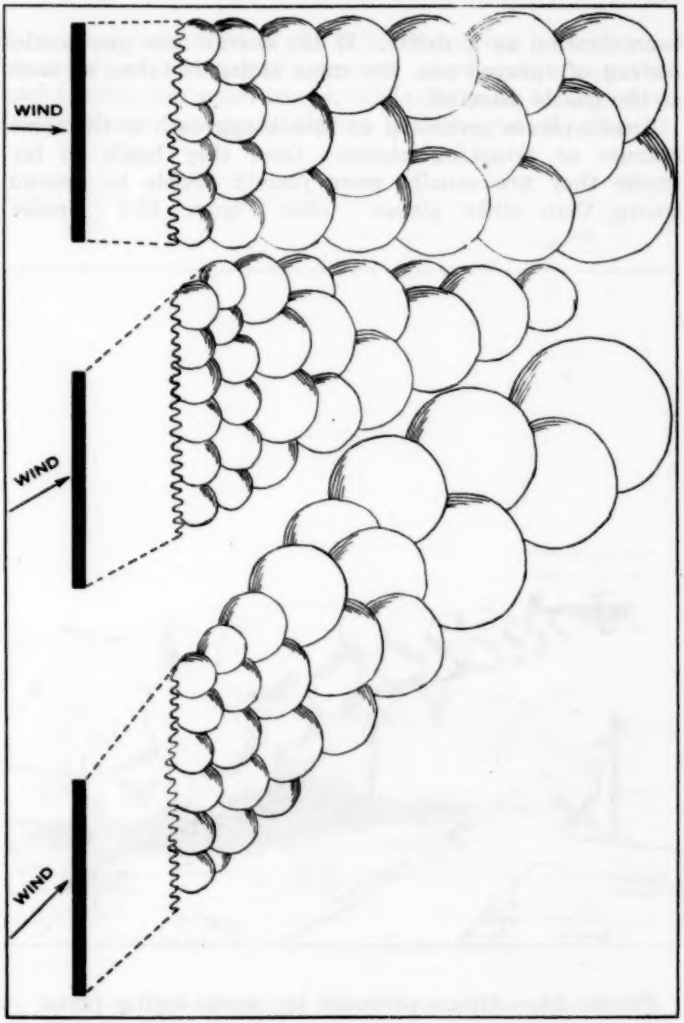

FIGURE 44.—The effect of wind on gas sprayed from airplanes. The solid lines represent paths of a plane while spraying gas. The clouds indicate the area on the ground on which the gas settles. (Not to scale.)

concentration as it drifts. If the enemy uses gas bombs instead of sprayed gas, the same action is taken as soon as the gas is detected.

Smoke planes preceding an attack approach in the same manner as attacking planes. Once they begin to lay smoke they are usually more plainly visible to ground troops than other planes. (See Figure 45.) Smoke

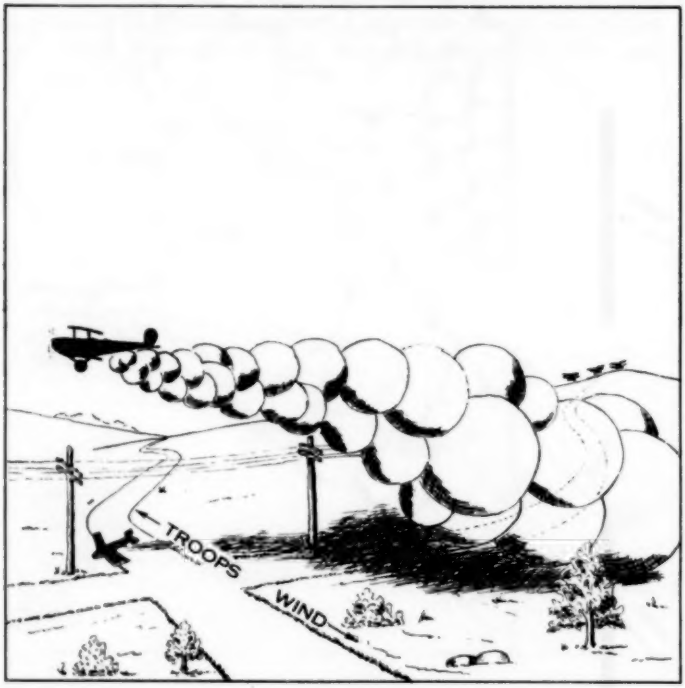

FIGURE 45.—Attack preceded by smoke-laying plane.

planes also are engaged by the full fire of infantry. When the terrain permits, troops should run into the wind out of the smoke, and then turn to fire at the bombing or gas planes as they come along the top of the smoke. This is

often possible in view of the difficulty on the part of hostile flyers of judging the ground wind and laying the smoke accurately upon troops, while flying at high speeds. Smoke planes, moreover, plainly indicate the direction of

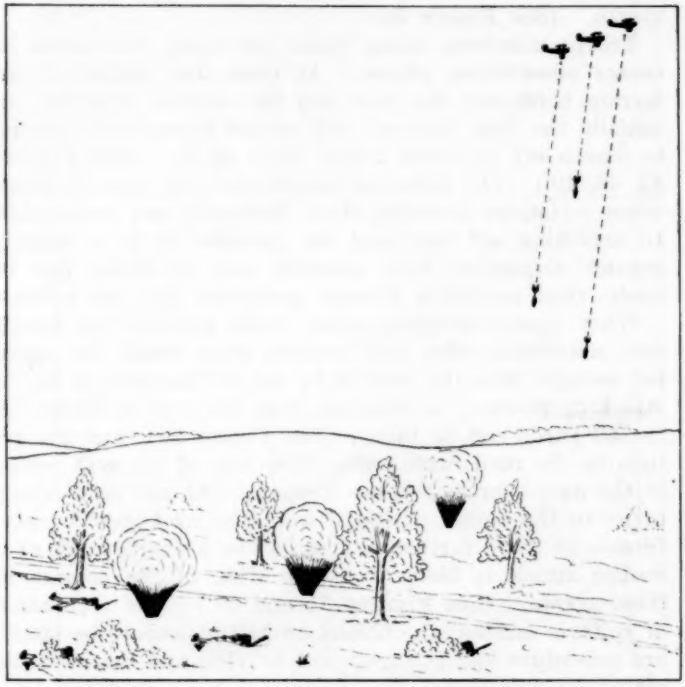

FIGURE 46.—A high bomb attack

the attack. Men caught in the smoke and unable to run out of it in a few seconds, should continue to move into the wind, if possible, until the attack passes over, when they should lie prone. The above formation and action have been described for a battalion because the battalion is the infantry marching unit. Larger units consist prin-

cipally of battalions and roughly equivalent or smaller units, all of which take the same protective measures.

When infantry units are attacked with bombs from altitudes beyond small-arms range, firing at the planes is, of course, useless. Instead, every effort is spent in deploying to seek cover from the bombs near the route of march. (See Figure 46.)

Troops marching along roads are easily discovered by enemy observation planes. At times the nature of the terrain bordering the road and the tactical situation, especially the time element, will permit troops and vehicles to march off the road rather than on it. (See Figures 47, 48, 49.) The battalion commander will have to judge when variations from the above formation are practicable. In marching off the road but parallel to it, a slightly greater dispersion, both laterally and in depth, can be made, thus providing greater protection for the column.

When troops marching along roads halt for the hourly rest, automatic rifles and machine guns should be placed far enough from the road to be out of the zone of fire of attacking planes. A distance from the road of from 100 to 150 yards can be taken, (See Figure 50), and the return to the road made, with little loss of the rest period to the men operating these weapons. At and near sharp turns in the route, positions near the road may be preferable to those farther out, since the probable path of a hostile attack is likely to swing wide of the column at these points. (See Figures 51 and 52.) The occupation of suitable defensive positions on halting should be standard procedure and is supervised by rifle and machine-gun platoon commanders.

If infantry columns must pass through defiles, such as important bridges, long, narrow valleys, and mountain passes, where dispersion is impossible, before entering the defile and while in it an area defense by infantry machine guns should be provided for the defile.

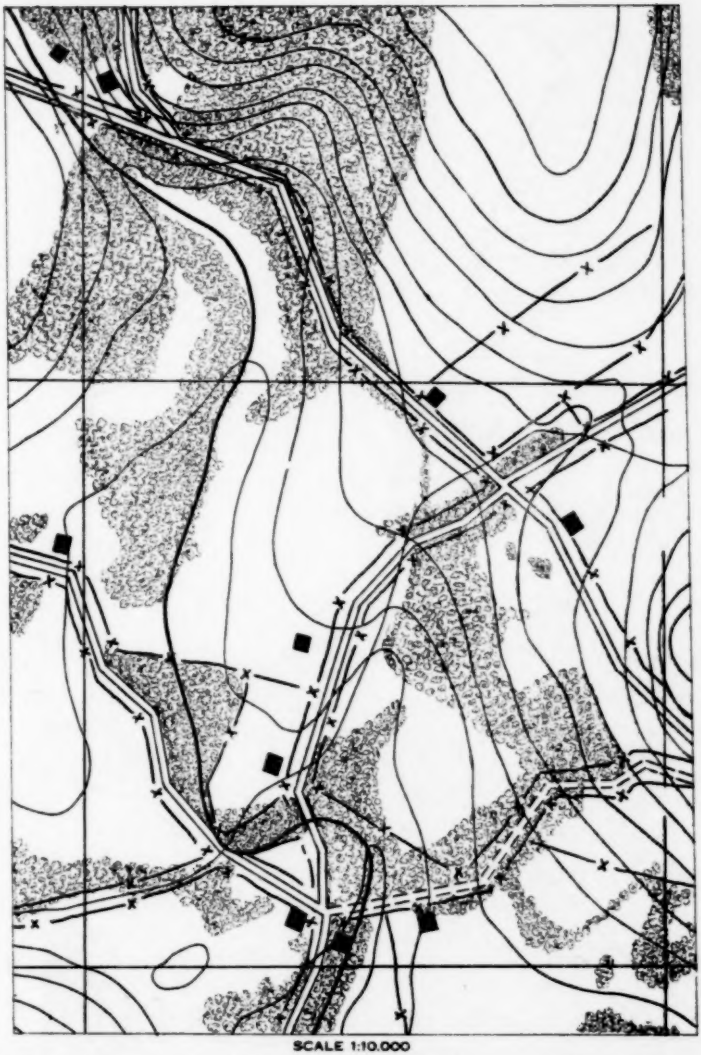

FIGURE 47.—Closed, broken terrain; fences, creeks, woods, rough ground, all force marching troops to stay on the right of way of roads.

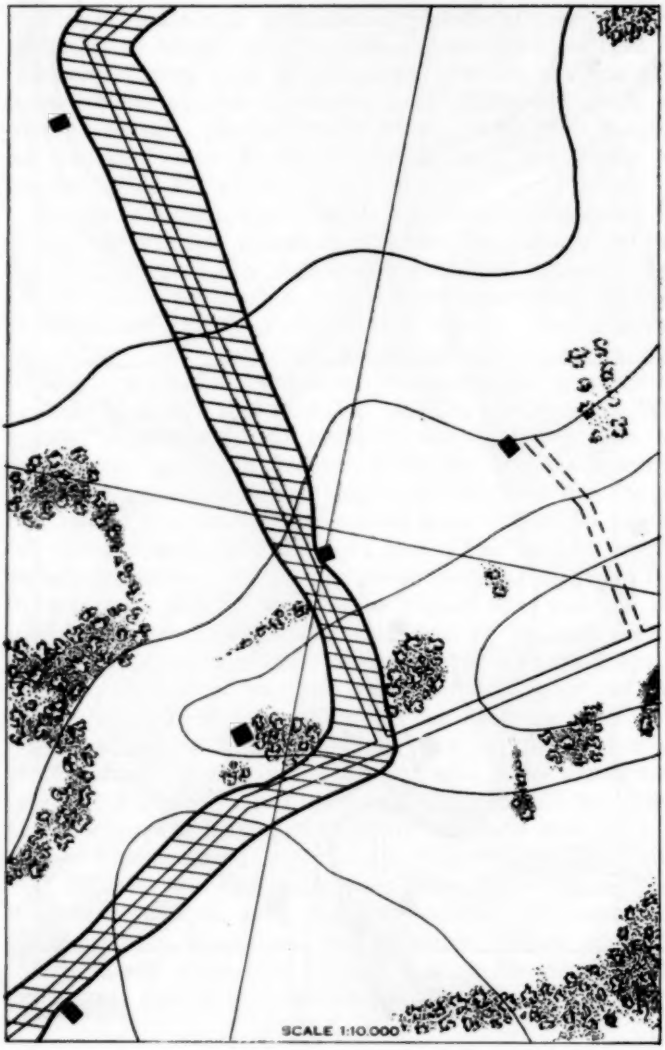

FIGURE 48.—Open country; troops can march well off the sides of the roads.

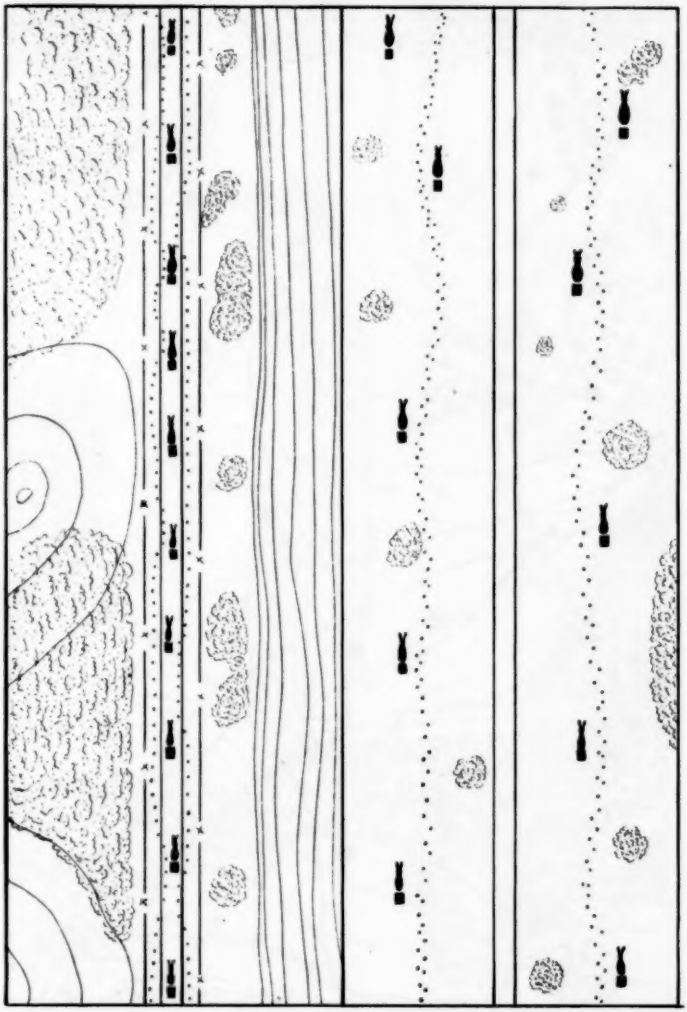

FIGURE 49.—March formations—antiaircraft.

Left: Troops forced by terrain to stay on the road and right of way.

Right: Troops marching out from the road where open country permits.

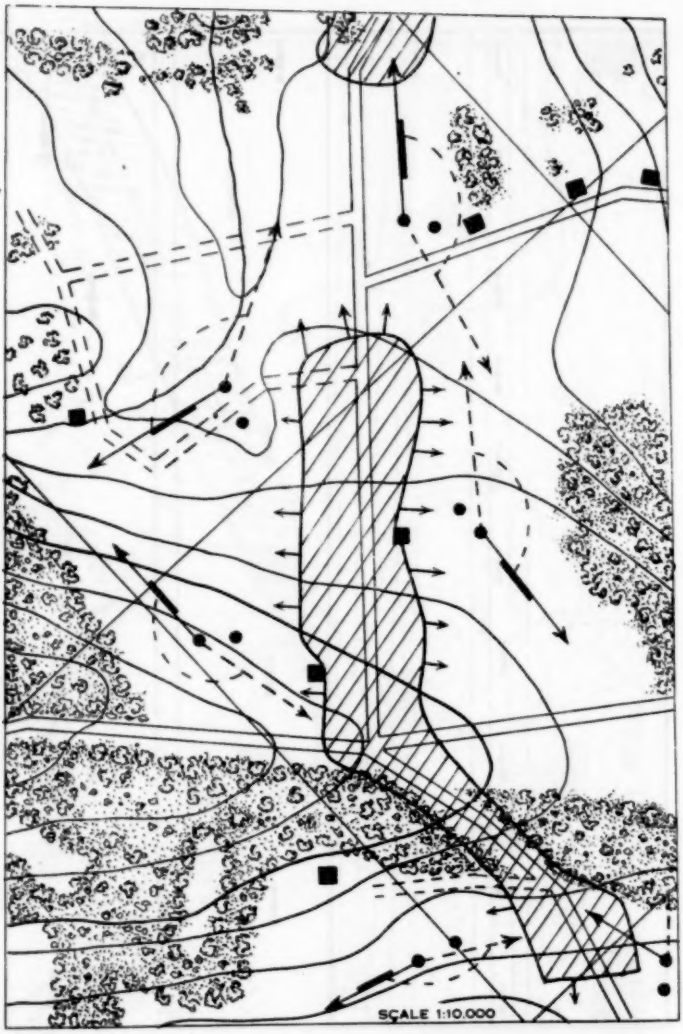

FIGURE 50.—A battalion at a halt. The battalion spreads out from the road as shown by the shaded area. Machine-guns take positions about 200 yards from the road, seeking all-around fire for the best protection of the column. Automatic riflemen (indicated by small arrows) are on the outer edge of the halt area.

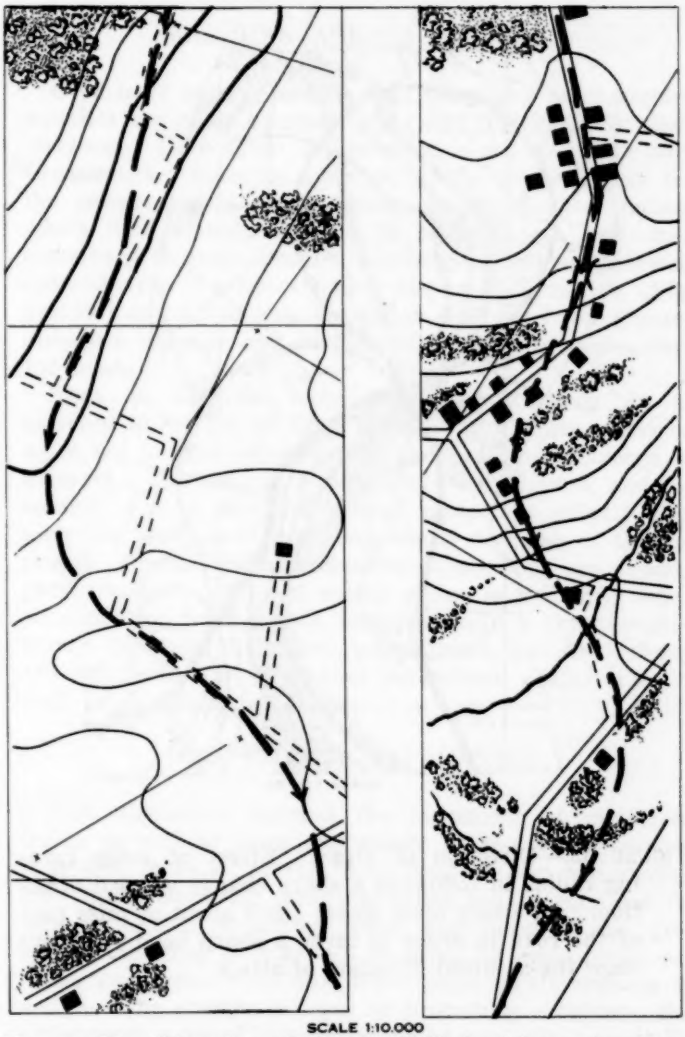

FIGURE 51.—Direction of flight.—Effect of large turning radius. The heavy lines show courses of attack planes along the irregular road. The turns of the road cannot be followed closely.

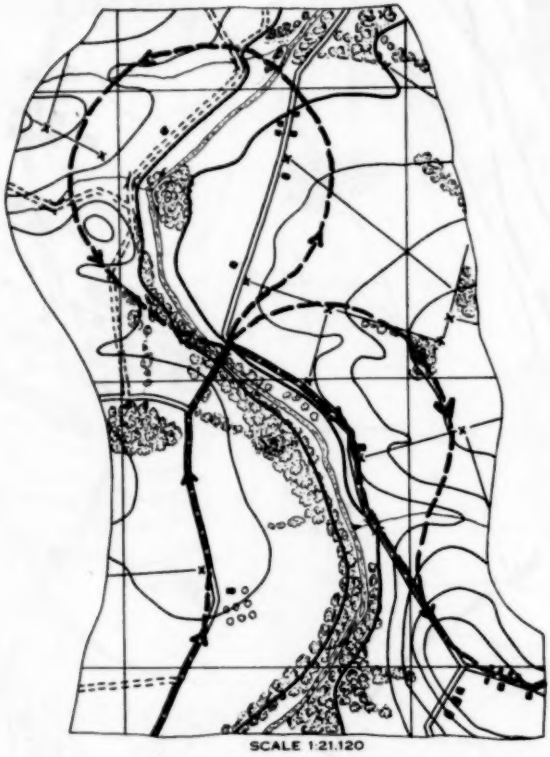

FIGURE 52.—Direction of attack: Effect of large turning radius in following a sharp change of road direction. An attack must either circle about or miss part of the road in order to cover a sharp bend. Arrows show the assumed direction of attack.

MARCHES ACROSS COUNTRY

Over most terrain and in most situations cross-country marches are made by small units and for relatively short distances. Here again the battalion is the marching unit. Cross-country marches generally mean extra fatigue for the troops and a much slower marching rate, factors which limit the distance to be marched. A unit once committed to cross-country marching is, unless otherwise ordered, free to adopt a widely dispersed formation (Figure 53.) so long as this dispersion does not cover greater distances laterally and in depth than those of deployment for combat.

Thus we see that a battalion, for example, can be marched in section or squad columns with units echeloned so as not to give hostile attack planes a line of troops as a target. The nature of the formations adopted, and the security groups used for ground protection, greatly simplify the problem of providing timely warning of the approach of attacking planes. Since the troops are already partly deployed, firing at enemy planes is ordinarily much simpler than from a road formation. In a cross-country march, however, dispersion, concealment, and fire defense are still factors in protecting the column against the attack by low-flying airplanes.

MOVEMENTS BY MOTORS

This discussion includes the movement of motorized trains as well as troop movements by motor. Moreover, it is well to recall at this point that we are considering only the antiaircraft measures taken by infantry for its own protection, measures taken regardless of the protection that may or may not be given by antiaircraft artillery or pursuit aviation. When antiaircraft artillery is assigned the specific mission of protecting a column, the antiaircraft fires of infantry machine-gun units, especially if motorized, are ordinarily coordinated with those of the other arm by the column commander.

Infantry's protection of motor movements is based prin-

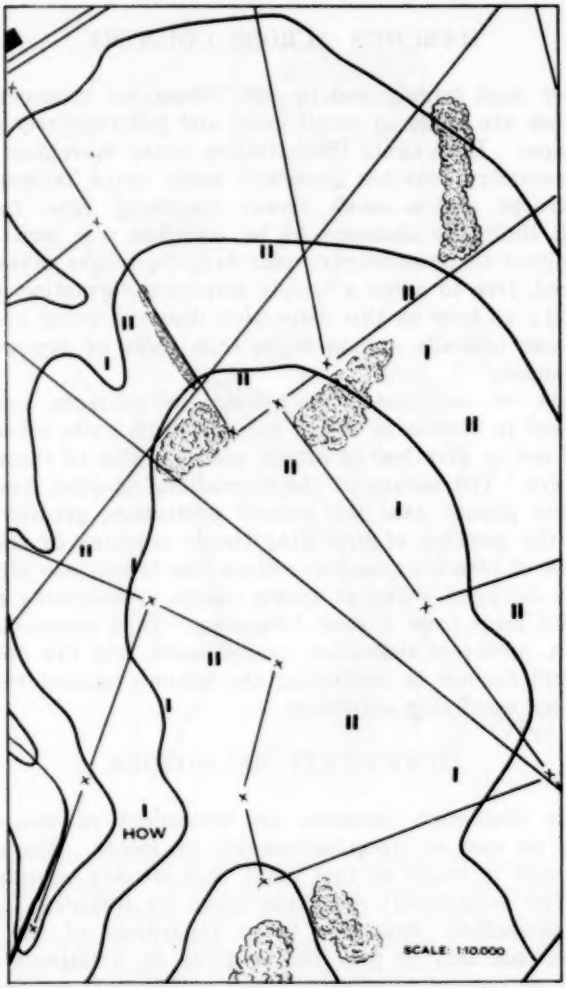

FIGURE 53.—A battalion marching across country shown to scale. Platoons in section columns abreast are indicated by double marks, and machine-gun sections by single marks. Any or all units may march deployed. There is no fixed formation for such marches.

cipally upon passive or negative measures. Nevertheless, the maximum fire possible from all weapons is directed at the attacking planes, although circumstances often greatly lower the efficiency of such fire, and sometimes preclude it.

All trucks should be equipped to mount machine guns for antiaircraft fire. It is not practicable to mount guns on all trucks carrying troops, but trucks transporting units with machine guns should always have a gun mounted and ready to fire. Rifles and automatic rifles should be carried available and ready to fire with little loss of time. Men armed with automatic rifles should be given favorable positions in trucks, from which automatic rifle fire can be delivered on attacking planes.

The protection of motor columns or movements is primarily gained by presenting as meager a target as possible for as short a time as possible, considering the movement as a whole. Every advantage is taken of the vehicles' speed. Generally, unless there is reason to the contrary, vehicles move individually at varying distances from a few yards to several hundred, and at the fastest practicable speed from the entrucking point to the detrucking point. If convoying is necessary, distances between trucks should be from 150 to 300 yards, and a speed of 35 to 40 miles per hour should be maintained wherever possible. Convoys, because of the regular distances between vehicles, are more readily detected by hostile observation aviation than movements with varying distances. (See Figures 54 and 55.)

Massing of troops and transportation is kept to the minimum at the entrucking or detrucking point. (See Figure 56.) At both points, machine gun defense should be established as described above. (See Figure 50.) This necessitates sending some machine guns on the first trucks. If traffic jams occur, units in trucks must be especially watchful for the approach of attack aviation, since such condensed groups, and the points at which they are liable to occur, form excellent targets for the aerial attack.

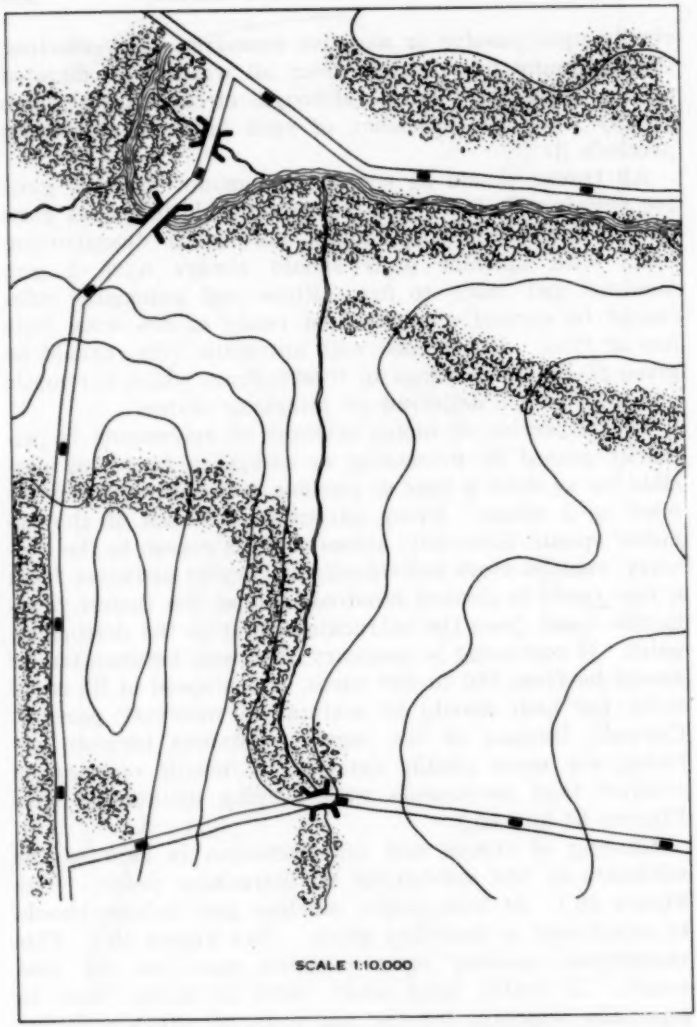

FIGURE 54.—Trucks on road at 150 yards distance shown to scale.

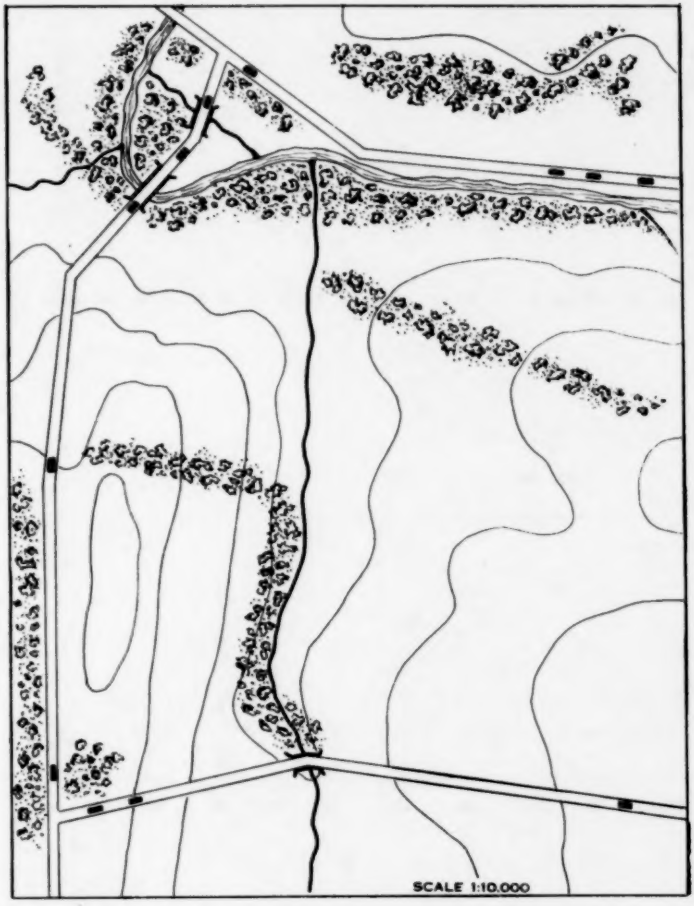

FIGURE 55.—Trucks moving at irregular distances shown to scale.

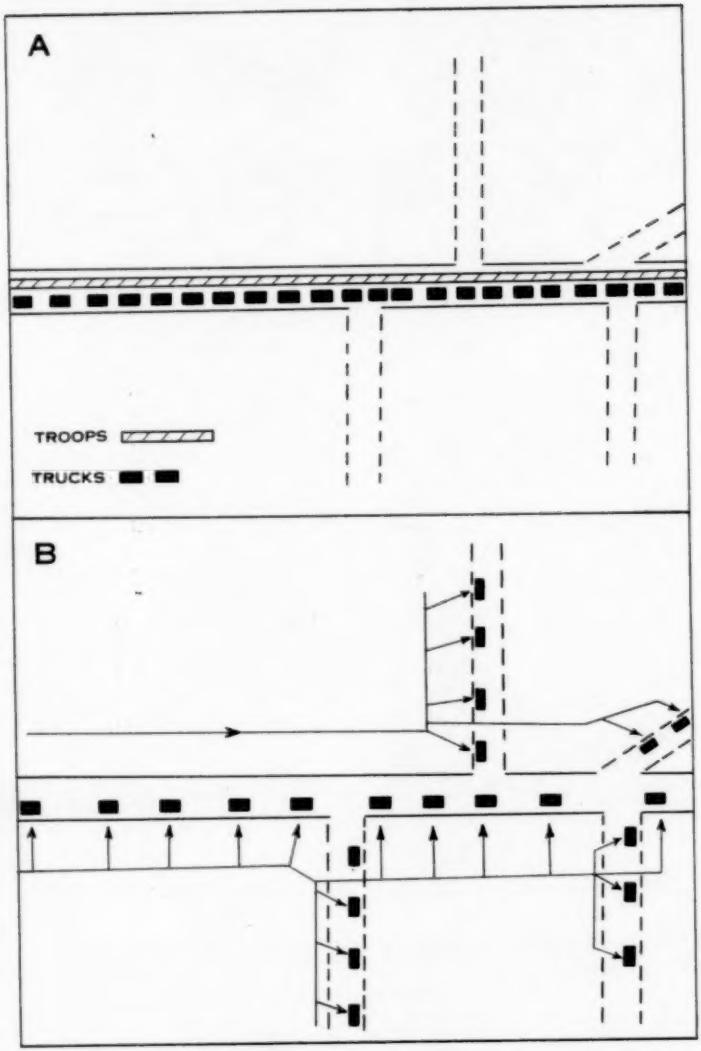

FIGURE 56.—Avoiding the massing of troops at detrucking and entrucking points.

(Figures *A* and *B* show the same number of trucks. In *A* the trucks are lined up in a single column on a main route, at short distances, and the troops have been marched in column alongside the vehicles to entruck. This forms a crowded mass and an ideal target for attack planes.

In *B* the same number of trucks has been placed along the same length of the main road; but by using side roads, lanes, driveways, and the like, the formation is not crowded. Troops can approach the trucks in small columns from off the road, thus remaining for a longer time in a deployed or semi-deployed formation less vulnerable to air attack. Where side roads, lanes, etc., are not available, the terrain to the sides of the road should be used to keep from crowding the troops and trucks, whenever possible. When this cannot be done, and the trucks all have to remain on the main route, the troops can still take advantage of the surrounding terrain to approach the trucks in file.)

Troops should be loaded into trucks by units, and successive trucks loaded with successive elements of the unit. At times, it may be advisable to dispatch platoons or even companies in small groups of trucks.

When attacked while moving on the road, trucks halt along the side of the road. If time permits the troops to unload and seek nearby cover, in time to open fire on the attacking planes, they do so. Otherwise they remain on the trucks. (See Figure 57.) Machine guns mounted on the trucks open fire immediately. Trucks not carrying machine guns halt along the side of the road and the personnel therein seek cover, if not armed. All trucks move rapidly on their objective as soon as the attack has passed.

MOVEMENT BY RAIL

Infantry's means of protecting itself during movements by rail consist of mounting machine guns and posting rifle squads, at intervals throughout the train, either on flat cars or on the tops of other cars. These weapons

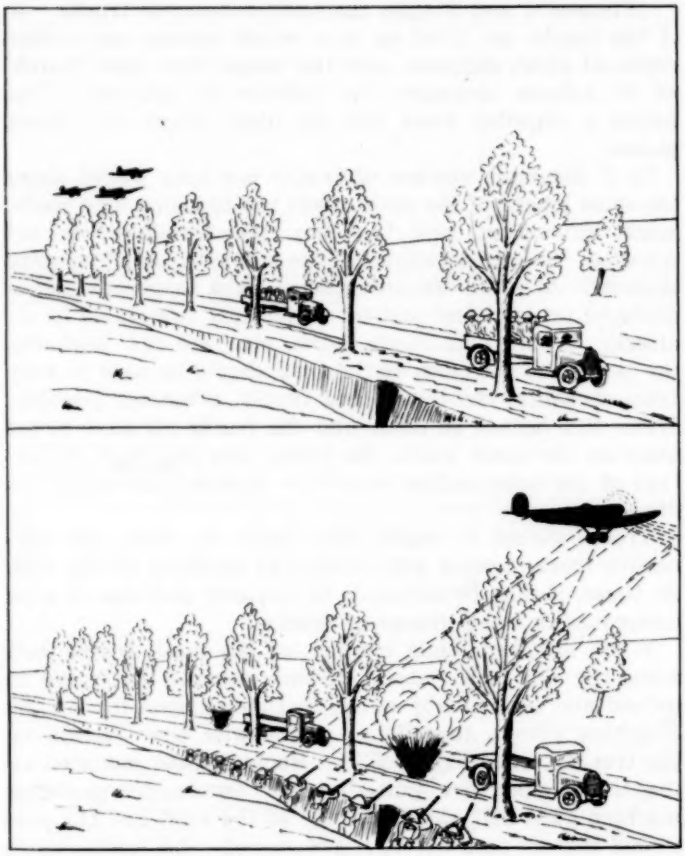

FIGURE 57.—If there is time to do so, troops leave the trucks and seek nearby cover. At least 30 seconds warning would have been needed in the case shown above to enable the men to all get from the trucks to the ditch and open fire. Often there will be less warning. In that case it is best to stay in the trucks.

open fire as soon as attacking planes come in sight. Automatic riflemen, posted at doors and windows of cars, also engage the planes at once. When possible to supplement the automatic rifle fire, riflemen are stationed in the same manner.

Troops moving in open cars (flat cars, gondolas, coal cars) form an especially vulnerable target to attack aviation. The troops are crowded together so that the flat trajectory aerial machine-gun fire is triply effective. During the World War, airmen frequently attacked such trains, often causing high casualties among the closely packed troops. The crowding also prevented most of the troops from placing return fire on the attacking planes, and what firing was done was inaccurate because of the train's movement. Open cars should not be used for troop movement when the enemy may be expected to attack from the air.

When an air attack is directed against a train forced to halt by the effect of a previous attack, or stopped for any other reason, the hostile air attack is met in the same manner as when the train is moving. However, men riding in open cars, get under the cars or take advantage of other nearby cover. When the train is to remain stopped for some time, troops disperse, seek the best nearby available cover and establish a defense similar to that shown in Figure 50 for a halted column.

Entraining and detraining points are usually within areas that have an organized antiaircraft defense, but often this is not the case. Unless otherwise ordered by higher authority, infantry units should put out their own local area defense during periods of entraining and detraining, regardless of other antiaircraft defenses. The methods of establishing this defense are similar to that shown in Figure 50, or to that described for defense of bivouac areas earlier in this chapter, all entraining and detraining points are prime targets for hostile air attack both from low and high altitudes. Such activities must be accomplished with all possible dispatch, and the massing of troops kept to a minimum as at entrucking and detrucking points. (Figure 56.)

DEFENSE OF BIVOUAC AND ASSEMBLY AREAS

Infantry in bivouac relies principally upon concealment and dispersion for its protection against attacks by low-flying aviation. An appreciation of aviation's great difficulty in locating troops in well-concealed bivouacs leads to the conclusion that negative measures should predominate in plans for their defense. Again, in view of the fact that the amount of cover afforded by woods and villages or towns is limited, and the number of troops and vehicles for which it is usually necessary to find concealment is great, it is seldom possible to bivouac regiments, or even battalions, in areas small enough to permit their establishing an all-around area defense with infantry machine guns, except when the four machine guns of each rifle company are available. However, a defense approximating as nearly as possible an area defense is always established for troops in bivouac areas as described in detail below.

It must be assumed, moreover, that infantry fire cannot possibly prevent hostile aviation from delivering its attack once it locates a bivouac and directs an attack against it. Consequently a considerable dispersion of units in bivouac in order to avoid casualties, even where concealment could be obtained for a large unit within a relative small area, is desirable.

DEFENSE OF BIVOUAC AREAS

From the above, it is seen that infantry's defense of a bivouac area begins with the selection of that area. Within the limits fixed by the tactical situation, infantry disperses to gain concealment and to lessen the effectiveness of the attacker's weapons. Within a regimental area there should be some distance between battalion areas. Units not equipped with weapons for defending themselves are bivouacked so as to receive protection from battalion weapons.

Bivouac areas near landmarks that may aid attacking planes in orienting themselves should be avoided whenever

possible. Creek and road intersections, which can easily be located from the air, are such points. Moreover, creeks and roads form the principal means of orientation for an air attack upon a wooded area, hence the route of such attacks will often follow the general direction of these terrain features.

CAMOUFLAGE

Having selected the area providing the best concealment, it is frequently necessary to employ camouflage to supplement the natural cover. Every precaution should be taken to avoid discovery. Movement within the area should be kept to the minimum, and roads and beaten trails should be avoided by day. But when roads and trails are used, as at night, old ones should be travelled in preference to forming new tracks and trails. New trails formed during the night should be camouflaged as soon as possible the next day.

POSITIVE DEFENSE MEASURES

After the necessary measures have been taken to conceal the bivouac and keep it concealed from enemy air observers, positive measures for its protection are taken. In the general case, certain directions are more likely than others as routes of approach for enemy attack planes. Bivouac areas, as we have seen above, are not suitable, because of their size, for the establishment of an area defense. (By an area defense in this instance is meant the location of infantry weapons so that enemy planes approaching the bivouac area from any direction are met by a volume of fire before they reach the area.)

But weapons can nevertheless be emplaced to cover likely routes of approach. In covering these probable routes of approach, the machine guns should be emplaced, whenever possible, out of the bivouac area so as to bring the full effect of their fires on the attacking planes before

they arrive over the bivouac area. They should be emplaced so that the approaching enemy receives the fire of at least a platoon of machine guns rather than by scattering a few guns over a wide area. Again machine guns should be emplaced whenever possible so that their all-around fire is not masked by trees or other obstacles. (See Figure 58.) Air guards and air-guard observers should be

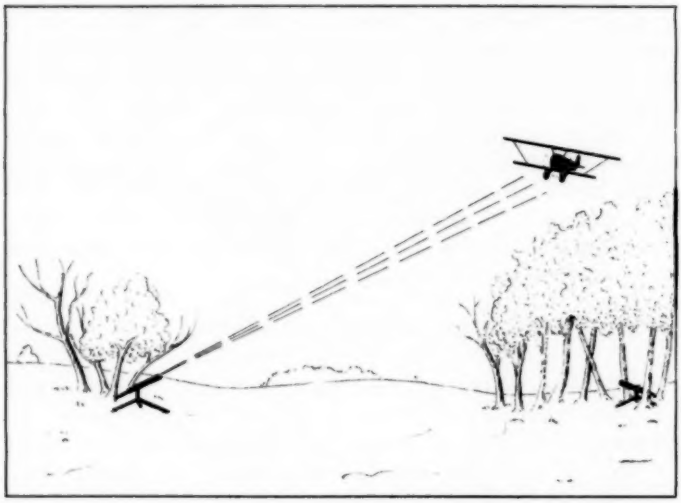

FIGURE 58.—Antiaircraft machine-gun positions. Places well out from woods are best. The gun in the woods cannot shoot at the plane while it is over the woods. The other gun has nearly all-around fire.

provided for timely warning of an attack. Air guards, observers, and machine-gun personnel should be frequently relieved since rest for all is a reason for being in bivouac.

If an attack by hostile air forces is at all probable, fox holes or shallow individual trenches should be dug. (See Figure 59.) These afford excellent protection from the air attacker's machine guns and fragmentation bombs. As

time permits, these may be developed into splinter-proof and bomb-proof shelters.

When a low air attack is deemed probable, men in bivouac should keep their weapons loaded and at hand at all times, whether at work or at rest.

If troops are discovered moving into a bivouac area during daylight hours, they should move to a new bivouac area as soon as darkness comes. Likewise, if they are attacked in bivouac, they should move to a new area as soon as such a move can be made secretly. If the enemy

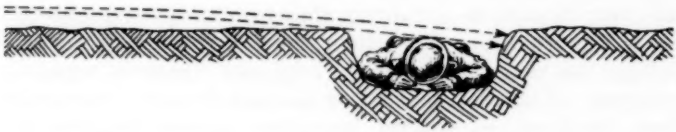

FIGURE 59.—Individual fox holes afford considerable protection against the flat trajectory fire of attack aircraft machine guns and against the fragmentation of bombs.

attacks troops in bivouac with persistent gas, they must be moved to a new area at once. Within forward areas or within locations liable to be attacked by aviation, troops should not bivouac in one place for longer than 24 hours if it can possibly be avoided.

Once an air attack is definitely launched against a bivouac area, the available fire of all weapons is directed against the attacking planes. All personnel seek the best cover available consistent with the delivery of fire on the enemy.

DEFENSE OF ASSEMBLY AREAS

Assembly areas are generally occupied for a much shorter time than bivouac areas. The tactical situation, in most cases, limits the concealment a unit may seek as well

as its dispersion. The degree of organization of its anti-aircraft fire defense is always considerably less, therefore, than in a bivouac area. Within these limits, the defense of troops in assembly areas against enemy aircraft is similar to the defense of bivouac areas.

If assembly areas or bivouac areas are attacked with heavy concentrations of persistent gas, the troops must move without delay to new assembly or bivouac areas.

DEFENSE DURING COMBAT

Units deployed for combat, either attacking or defending, offer a poor target to the enemy's aviation because of their dispersion and their ability to take cover quickly. (See Figure 53.) To attack them is to attack targets within the range of the enemy's ground weapons, which is contrary to much authoritative tactical thought. Nevertheless, doctrines of several important powers contemplate such a use; and, in periods of grave emergency, any army may decide to use attack planes on the battlefield. This, as we have seen earlier in this text, occurred time after time during the World War. We cannot say, consequently, that such attacks will not be made, simply because we know they are contrary to a general principle of aerial warfare.

Hence troops must be prepared to meet air attacks during battle, especially when the success of our attack or defense is a vital matter to the enemy. The one guiding principle is that troops direct their fire against the enemy most dangerous to them, air or ground. Certainly the shifting of fire directed against the enemy's ground troops to his attacking planes can have no appreciable effect on the ground situation, since the enemy planes are overhead for only a few seconds.

IN THE DEFENSE

Defending troops place all available fire on planes that attack them at the same time that hostile ground troops are attacking. Troops on the forward position, however,

should never fire on enemy planes not attacking them if such fire gives away their positions. However, units whose positions have undoubtedly been discovered should fire on all enemy planes within range. The commander of the battalion sector is the lowest commander to authorize such fire.

IN THE ATTACK

Troops advancing to the attack take cover and direct the fire of all available weapons against the attacking planes. The extensive use of air guards and air-guard observers is impracticable for troops actually engaged with the enemy. In this situation, men must watch both for air and ground targets, and notify at once their unit commander of the approach of enemy planes. Because of irregularities of terrain and extended troop deployment, which localize control, effective action against air attacks is usually the responsibility of the small unit commander, the company and platoon commander, or even the section leader.

DEFENSE OF TRAINS

The defense of infantry trains, both combat and field, is a serious problem for the infantry. So far as infantry is concerned, these elements will have to rely almost wholly on passive measures for their protection. There is no reason in most situations for field trains to move during the day. If they are motorized, as in all probability they will be, field trains seek protection by concealment and dispersion in the rear areas where they are also protected to some extent by antiaircraft artillery furnishing protection to other elements of higher headquarters. Infantry will rarely detach combat elements from their more important missions for the air protection of trains. It is also impracticable to equip trucks or other vehicles with machine guns and to rely upon the driver and his assistant to operate them effectively. The lack of sufficient weapons and time for training personnel are serious

obstacles to such a solution. Combat trains must be kept relatively near the combat troops. In offensive action, particularly, they have to operate during the day. However, infantry's combat vehicles are comparatively few in number. Their protection must be obtained by dispersion and concealment to the maximum extent. During part of the time, also, combat trains receive incidental protection from antiaircraft weapons emplaced for the protection of other elements by higher headquarters.

USE OF INFANTRY FOR THE PROTECTION OF IMPORTANT AREAS

During the early stages of a war the inadequacy of antiaircraft artillery may necessitate the detail of infantry units to furnish protection against low-flying air attacks for airdromes, supply establishments, sensitive points on lines of communication, and similar areas that offer remunerative targets to enemy air attacks. In such cases, infantry will, in so far as practicable, establish an area defense for the area protected. Machine-gun units only may be used for this purpose. They will be emplaced in concealed or camouflaged positions covering the likely avenues of approach of the enemy's planes. Infantry units will never be used for this purpose if it can possibly be avoided.

DEFENSE AT NIGHT

Infantry's defense, when the troops cannot see to fire on the enemy's planes, is wholly passive. Negative measures alone can be taken at such times. Every effort is made to keep the enemy from discovering the movement of troops or trains, or bivouac areas. Lights of all kinds must be prohibited or concealed. For instance, if the stoplight on the rear of motor vehicles operated by the foot brake is not disconnected, it should be so dimmed that it cannot be picked up from the air. Whenever possible, roads difficult to be seen from the air and roads that have many curves and overhanging trees are used. Troops and

vehicles are dispersed within the limits permissible by the ground situation. The formation pictured in Figure 33 is suitable for night movements when the road situation permits its use. When attacked at night marching troops deploy a short distance to the sides of the road and throw themselves flat on the ground. They should never remain standing and halted. Night attack by aviation on ground troops is most difficult to accomplish. Infantry without antiaircraft artillery protection protects itself by concealment and dispersion. If the visibility is sufficient to see the attacking planes, all available fire is directed against them. The use of flares by enemy planes may, in some cases, produce conditions comparable to daytime visibility. In such a case, action when attacked parallels the action taken when attacked during the day.

CHAPTER 13

Small Problems—Infantry

A Skirmish in Nicaragua*

At dawn on 27 February 1928, a pack train, convoyed by a marine patrol, pushes out of Estelli, Nicaragua, along the trail to Yali, loaded with supplies for the company of marines on outpost duty there. (See Figure 60.) The train consists of forty pack animals; and the patrol of three squads, a gunnery sergeant, one sergeant, a hospital corpsman, and a messenger, all under the command of a lieutenant. The last three are mounted, the remaining men on foot. This is the first patrol for all the men, but they perform the job in an excellent manner. For in spite of the difficult terrain and the heavy mud of the trail they make the thirty miles to Yali in remarkable time, arriving just after dark.

The company of marines at Yali was one of several units in the area engaged in the mission of maintaining order until a Nicaraguan force could be trained to take over that task. Now, the chief disturber of the peace was General Augustino Caesar Sandino. He had been one of the leaders in the recent successful revolution. But when the fruits of victory were distributed Sandino felt that his portion was a lemon. Accordingly he withdrew his forces to northern Nicaragua and placed himself in

*Based upon an oral monograph delivered by Harold D. Harris, 1st Lieutenant, U. S. M. C., a student in the Regular Course, The Infantry School, Fort Benning, Georgia, 1934-35.

opposition to the government and the "Invaders", as he termed the marines. Several bands of brigands in that area joined his banner so that he was nominally at the head of some thousand men.

It was the threat of Sandino's band that forced the marines to convoy all pack trains carrying supplies to their far-flung outposts. Therefore, upon the safe arrival of the train and convoy at Yali, all hands felt that a perilous task had been well done and looked forward to a couple of day's rest before the return journey. But their hopes were shortly blasted, for they were no more than bedded down when orders came directing the patrol with its pack train to proceed at daylight the following morning to Condega, where another outpost company was stationed.

Accordingly the patrol set out the next morning for Condega. That village appeared, on the map available at the time, to be only some 12 miles from Yali. The day's march should be an easy one. But the trail was much more difficult than that of the preceding day, and men and animals were fagged out when the lieutenant halted his patrol about 1:30 PM near the road junction at *A*. Upon inquiry there he learned to his consternation that he was still 17 miles from Condega. He then asked if there were any large ranches in the vicinity, and found that there was one at Darali. There were two roads to that point. One led over the mountain and was the shorter route to Condega; the second went through a defile but the going was easier. Both roads were cut through heavy woods filled with dense undergrowth—potential ambush at many points.

The lieutenant now considers the terrain, the roads, the condition of men and animals, the distance to Condega and the character of Sandino's band and comes to a decision.

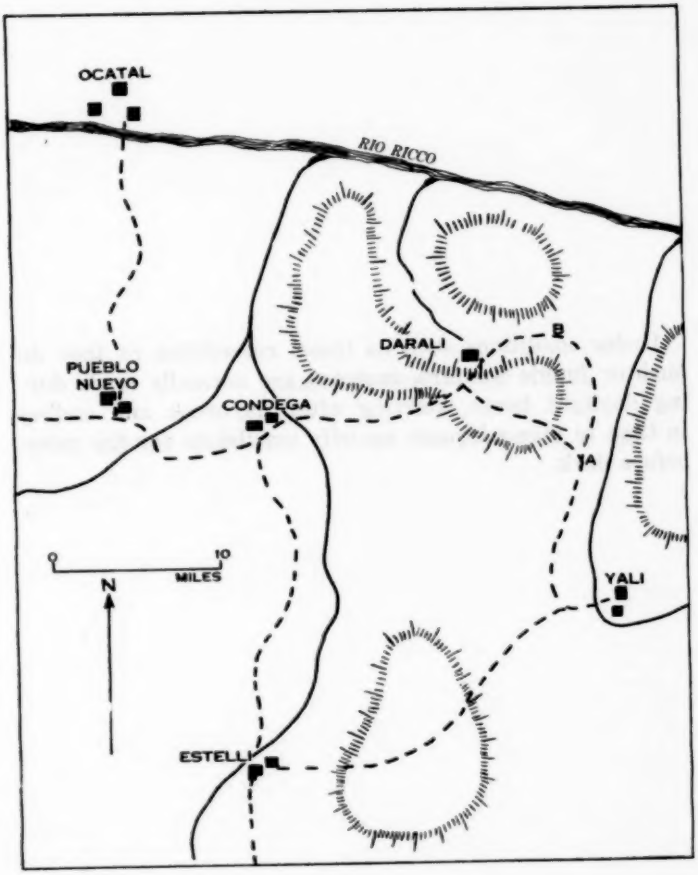
OCATAL
RIO RICCO
DARALI
B
PUEBLO NUEVO
CONDEGA
YA
0
10
MILES
N
YALI
ESTELLI

FIGURE 60.

Under conditions such as these, resembling as they do bush or jungle warfare, marches are normally made during daylight hours, starting after daybreak and ending in time to take adequate security provisions for the camp before dark.

REQUIREMENT

You are the lieutenant. What do you decide to do?

HISTORICAL SOLUTION

The distance to Condega precluded the possibility of reaching there before nightfall.

The lieutenant decided to go through the defile, reach Darali—about four hours' march away—before dark, bivouac there overnight, and push on to Condega the following morning.

Accordingly, the patrol moved out after a short rest and before long entered the defile near *B*.

REQUIREMENT

What formation should the patrol adopt as it moves through the defile?

DISCUSSION

A march under these conditions must be conducted on the assumption that the enemy may attack *suddenly, at any time,* and *from any direction.* In consequence, the formation must be such that part of the force is ready at all times to return hostile fire, whether that fire comes from the front, rear, or flank. The march formation, therefore, must provide protection on every side.

In dense woods or jungle, where movements off trails are very slow and arduous, flank protection becomes difficult. In such country, it is obvious, flankers cannot move parallel to a column (if they can move at all) without unduly reducing its speed. However, stationary flankers or sentinels can be pushed a short distance to either flank, remain in position until the column has passed and join the rear guard. This method requires frequent halts, particularly in small commands, for readjustments—moving men up from the rear to the head of column, as the advance guard becomes depleted. But it nevertheless does afford some flank security.

HISTORICAL SOLUTION

The patrol moved into the defile with the first squad under a corporal forming the advance guard, the second squad herding the animals, and the third protecting the rear. The sergeant commanded the second squad and the gunnery sergeant the rear guard. Apparently no provision was made for flank protection.

About four-thirty in the afternoon the lieutenant, seeing the defile opening out, rode to the head of the column. When he arrived at *C* (Figure 61) he looked across the cornfield and there, deceptively close, was Darali. He looked back at his weary, straggling column, and then, mindful of the fatigue of his men, decided to move through

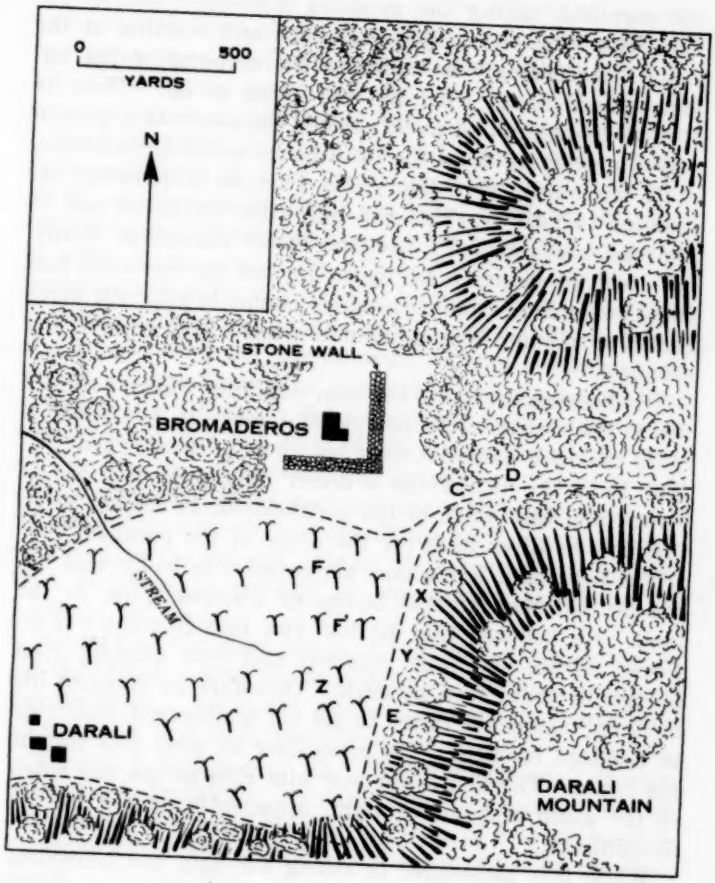
0
500
YARDS
N
STONE WALL
BROMADEROS
C
D
STREAM
F
F'
X
Y
Z
E
DARALI
DARALI
MOUNTAIN

FIGURE 61.

the cornfield, taking the mounted messenger and corpsman with him, and arrange for food and billeting at the ranch. Accordingly he called to the corporal of the advance-guard squad what he was going to do. Then he trotted off again, and as he entered the cornfield a woman waved a greeting from the little house called Bromaderos.

He has hardly gone 200 yards when he is suddenly astounded to hear machine-gun and rifle fire break out in his rear, accompanied by several heavy explosions. Whirling about to ascertain the cause, he and the two with him come under fire. The corpsman's mount is hit. All three hastily dismount, take cover, and crawl to the edge of the cornfield.

The lieutenant calls to the men with him, "Stay here, I'll try to get across to the patrol—if I make it, you follow."

He makes a dash but does not cover a dozen yards before he is the target for a dozen riflemen. His hat is struck and sails back to the cornfield—it is suicide to go farther—he dives back for the cover of the cornfield.

The lieutenant knew that his patrol was badly shot up, for he had seen several bodies of marines lying in the trail. He believed that he had run into Sandino's main force. If so, help was required and that quickly, even though it would soon be dark. Therefore he directed his mounted messenger to try to get out unobserved, then ride to Condega for help. The messenger by good luck caught his horse. The lieutenant saw him ride across the ridge to the south and out of sight, apparently unseen by the Sandinistas.

While this messenger is riding for help the leaderless patrol back on the trail is hard pressed. The men of the advance guard had felt that the day's work was practically over when they heard the lieutenant call to their corporal. Almost at their bivouac, they had relaxed their vigilance, gathered in a group, and proceeded merrily along the way. The second squad herding the animals had be-

come greatly elongated in spite of the efforts of the sergeant to keep them closed up. (Possibly the mules did not feel cooperative.) Their day had been a long one, too. The third squad, under the gunnery sergeant, had for some unknown reason lagged well back of the pack train.

With the patrol in this shape hell breaks loose. A machine gun opens up from behind the stone wall. Six men of the advance-guard squad are killed outright, the other two, wounded, manage to crawl to cover off the trail. One of these is the automatic rifleman. Simultaneously the center squad with the animals receives heavy rifle fire from the heights on either flank. Large cowhide bombs are thrown down on the animals. These bombs explode with a terrific force, and while they cause no casualties, stampede the animals. The stampeding herd carries away one autorifle and one rifle of the second squad, for two of the men had strapped their weapons to the pack animals. The third squad sees and hears the commotion and firing, and withdraws to cover off the trail, apparently unobserved by the bandits. Under the command of the gunnery sergeant, it remains in comparative safety in the bush.

As soon as the first shock of the sudden attack wears off the sergeant with the second squad sets about rallying the survivors. He works cautiously along the north side of the trail, and finds the automatic rifleman of the advance-guard squad near *D*. The autorifleman, though wounded, is frantically striving to fire his weapon, for he has a most favorable target—a group of twenty bandits clustered about the bodies of the six marines of the first squad, stripping them of weapons and other articles that met their fancy. But the automatic rifle fails to fire.

REQUIREMENT

You are the sergeant. What do you do?

HISTORICAL SOLUTION

The sergeant applied the first step of immediate action. He took the rifle, tapped the magazine into position, pulled back and then pushed forward the operating handle, aimed, and opened fire.

DISCUSSION

Immediate action is the unhesitating application of a probable remedy for a stoppage. The sergeant applied the first step in case of any stoppage. It will reduce practically 90 per cent of those that occur. If the automatic rifleman had been so trained that he would mechanically, without thought, perform the first step of immediate action, a considerable number of bandits would have been wiped out.

Unfortunately the group of Sandinistas had begun to disperse when the sergeant opened fire and he succeeded in wounding only two. The entire group dived to cover behind the stone wall. Soon the sergeant and autorifleman were under machine-gun fire from behind the stone wall and rifle fire from the heights. But the bandits were unable to see them and fired only in the general direction of the automatic rifle fire. Fortunately neither

of the two men was hit, but they decided it was too hot to remain long in that area.

Both the sergeant and private worked their way some distance to the rear, crossed to the south side of the trail and moved westward. Finally the sergeant gathered together all of the second squad and the two survivors of the advance-guard squad. They then made a concerted effort to drive forward toward the cornfield but the bandit fire and occasional bombs stopped the attempt. After two more men were wounded, the sergeant abandoned his plan to join the lieutenant, and withdrew a few hundred yards to the east. He sent word back to the gunnery sergeant, who was the senior, telling him that the lieutenant was cut off from the patrol, that the first squad was practically wiped out, that bandit fire was being received from the front and both flanks, that he (the gunnery sergeant) had better get the patrol together and take over.

The rear-guard squad was still some distance to the rear and halted under cover off the trail. Apparently the bandits were unaware of its presence for it had not entered the fight. The mission of the squad was "to cover the rear of the patrol in case of trouble."

REQUIREMENT

You are the sergeant. What are your orders and actions?

DISCUSSION

The bandits had not yet reached the rear of the patrol, and as yet no Sandinistas were between the rear guard and the second squad. Therefore the gunnery sergeant could have promptly moved up and joined forces with the remainder of the patrol. This would have concentrated the power of this small force and it could then better ward off an attack from any direction. But divided as it was it was liable to defeat in detail. The mission of a rear guard is one of security and protection of the main body. By joining the remainder of the patrol, the rear guard would in this case be fulfilling its mission. Security of the entire group demanded concentration, and while moving up it could protect the patrol from any bandit force advancing from the east. In any event the patrol would, sooner or later, be surrounded, fighting faced in every direction of the compass. Which would be the "rear" then?

HISTORICAL SOLUTION

The gunnery sergeant replied to Sergeant "2d Squad" that he "had his orders" and was going to stay where he was. And stay he did for he did not get into the fight until the following afternoon.

Sergeant "2d Squad" on receiving the gunnery sergeant's reply, attempted to move his group to the rear and join the rear guard but was unsuccessful. The bandits, unaware of the presence of the rear squad, were now between the two groups of Marines.

Darkness was rapidly approaching and the forward group was now surrounded. A ring was formed, wound-

ed men placed in the center and preparations made for defense. Shortly after dark the bandits rushed the position but the attack was beaten off by rapid rifle and automatic rifle fire. Twice more during the night the little band staved off rushes.

And over in the cornfield the lieutenant and corpsman spent a horrible night. Only by incessant and varied movement did they elude the force trying to locate them.

The messenger to the Condega outpost arrived there about 10:00 PM and when challenged answered "Marine." The captain in command of the outpost went out expecting to welcome the patrol, but was greeted instead with the information that the patrol had been ambushed, badly shot-up by a force of about 300, and needed immediate help.

Only seven squads were stationed at Condega, but arms for an additional squad were kept there; also a few Thompson submachine guns.

The captain's first thought is to wire to battalion headquarters at Pueblo Nuevo for additional troops. But the telegraph line is dead in all directions. He tries the radio but that fails, too. He finally decides to move to the rescue of the patrol at once with four squads, leaving three squads at Condega.

REQUIREMENT

You are the captain. Would you make any readjustment of available weapons within your company before moving out?

HISTORICAL SOLUTION

The captain issued a sub-machine gun, an additional Browning automatic rifle, and an additional grenade discharger to each squad he took with him. Also plenty of ammunition, including hand and rifle grenades, was distributed. Thus each squad was armed with two automatic rifles, two grenade dischargers, one Thompson submachine gun, and three rifles.

DISCUSSION

The captain knew that he must offset the numerical superiority of the bandits by increasing the normal firepower of the four squads. This he did as we have just seen. He knew that the fire of the automatic rifle is equivalent to that of several riflemen, that it furnishes the fire support of the squad in advancing, and that grenades are effective at short ranges against an enemy who has sought shelter in trenches or behind cover where rifle fire cannot reach him.

These four squads, though powerful in the fire fight, were highly mobile, particularly in dense undergrowth and mountainous terrain. This small force possessed, therefore, the cardinal characteristics of good infantry—mobility and firepower—the aim of the organization discussed in Chapter 1 of this volume.

At 10:45 PM the patrol on foot is under way. One officer, one warrant officer, and 32 men start out to engage a force of some 300. Just after dawn the relief patrol is descending Darali Mountain. As the men at the head of the column arrive at *E* they look along the trail to the north, and there in the dim light of dawn lay the multilated bodies of six marines.

Then, they suddenly see a swarm of bandits rushing out of the jungle on the right, across the trail and toward the cornfield, waving machetes and yelling, "Viva Sandino —Muerto los Yanquis!" This *is* a target and without hesitation the leading squad opens fire. Marksmanship is poor in the dim light at this range, but the bandits melt like magic back into the brush.

Although this is the first warning they have of the arrival of another force of Marines, the bandits are not long in meeting the situation. The patrol soon receives heavy fire from brush near *X* and from the house and stone wall. But before long the entire patrol is under cover in the cornfield on the line *FF'*, facing generally northeast. The fire fight starts with neither side gaining an advantage at first. The lieutenant, still in the cornfield, soon joins the captain and relates the situation as he knows it.

As he talks the Marines received heavy fire from *Y*, then some from *Z*. The bandits are extending their line and will soon envelop the relief patrol. The present position is untenable. The captain's mission is to reach the convoy patrol still in the defile.

REQUIREMENT

You are the captain. What are your actions and orders?

HISTORICAL SOLUTION

The captain moved along the line rapidly, instructed the rifle grenadiers on the left to lob grenades over the stone wall and to the area of *X* as fast as they could; the grenadiers on the right were told to smother the area of *Y* where the heaviest fire was coming from; all other weapons were directed to fire rapidly and at the captain's signal all men were to rush across the trail toward *X* and into the cover of the brush.

The improvised rifle grenade barrage accomplishes what rifle fire on a well-protected position could not. Bandit fire at the house, back of the stone wall, and near *X* ceases; the other fire slackens. This is the moment for the rush, and the signal is given. As one man the patrol is up, dashing across the trail and up the slope. The bandits near *X* have fled. All the Marines are under cover of the brush without a casualty.

Immediately the patrol drove eastward, in an irregular line along the heights south of the trail. Hindered more by the dense undergrowth than by bandit fire, its progress was slow. But by noon they reached the sergeant's group. Ammunition was redistributed and new heart was put into the survivors. The group then continued and shortly established contact with the third (rear-guard) squad.

A division of the force was now made. Two squads under the lieutenant crossed the trail to the north side and moved west, while the remaining four squads paralleled the movement south of the trail. Both groups gradually shouldered their way forward, maintaining contact and assisting each other by fire. Here again the fire power of the six squads, augmented as it was by the additional automatic weapons and the high-angle fire of rifle grenades, proved effective against some three hundred bandits. By three o'clock the Sandinistas had abandoned their position and gone for good.

The Marines had suffered 6 killed and 10 wounded; the Sandino force 12 killed and 25 wounded. The wounded were treated, and upon the arrival of additional marines from Pubelo Nueve about four o'clock, the force moved back to Condega.

It was learned later that the convoy patrol had been ambushed by Sandino's main army and that Sandino himself had been some five miles away during the action. The bandit force had been actively directed by that wily old Central American soldier of fortune, General Jiron.

CHAPTER 14

Elementary Problems In Machine-Gun Indirect Laying

Indirect laying is that technique by means of which machine-gun fire is directed upon a target that cannot be seen by the gunner.

This method has two, and only two, fundamentals: first, we must find how much the muzzle of the gun must be elevated (or depressed) for bullets to reach the target. Once we know that factor we can, unless a mask intervenes, hit the target—provided we know just where, on the vast perimeter of skyline about us, the gun must be pointed. This brings us to the second fundamental: how to lay the gun for direction. These are the two basic elements of indirect laying. In explaining them, a number of technical terms must be used, but if the reader will cling fast to these fundamentals, he will have little difficulty in solving the problems given below and all problems similar to them.

There are two ways of getting the information we need in order to hit targets we cannot see. We can use a map, or the ground itself. But very few areas have been mapped accurately enough for the maps to be used in machine-gun firing. Hence the ground (TOG) method of obtaining data is the more important to know and understand, and is the method discussed in this chapter.

The problems that follow are designed to illustrate the essentials of this method. No prior knowledge of this subject is necessary to solve them. Moreover, the solutions can be followed readily without manually performing the plotting. But if the reader desires to plot the problems, he will need this equipment; a hard pencil (3H, 4H, or 5H), the machine-gun protractor given in the pocket at

the end of this volume, a straight edge or ruler, blank sheets of paper about 8 by 12 inches in size, and a pin or a glass headed thumb tack. (If the reader has a celluloid protractor it will be more convenient to use than the protractor at the end of this chapter, because the straight edge of such a protractor can be used in place of a ruler.)

The pencil should be sharpened to a fine chisel point.

The map (Figure 62) gives a bird's-eye picture of the ground used in the problems and the relative positions of all the points involved in them. No attempt should be made, however, to secure data from the map.

PROBLEM NO. 1

SITUATION

Look at the map (Figure 62) and find the points, *1*, *2*, and *3*. (Each "point" is the center of the circle shown.)

Imagine that you are at point *2*, and have with you certain instruments. Label this point *O* meaning *OP* (observation point). Imagine also that a machine gun with its crew is at point *3*. Label this point *G* for "gun". You wish to direct the fire of this gun on a target at point *1*. Label this point *T* for "target".

From your position at *O* you can see both gun and target. Assume that you have already collected certain data which has enabled you to plot accurately on a piece of paper the three points *T*, *O*, and *G* in their correct relative positions, as in Figure 63. (How to collect these data will be shown later.) Note that the relative locations of the three points are the same on this drawing as they are on the ground (as shown by the map).

Figure 64 shows the terrain as it appears to the gunner seated behind the gun at *G*. He can see the instruments at *O* but the target is hidden by the woods.

REQUIREMENT

Now devise a method by means of which you can direct the gun crew to lay the gun so that it will point in the

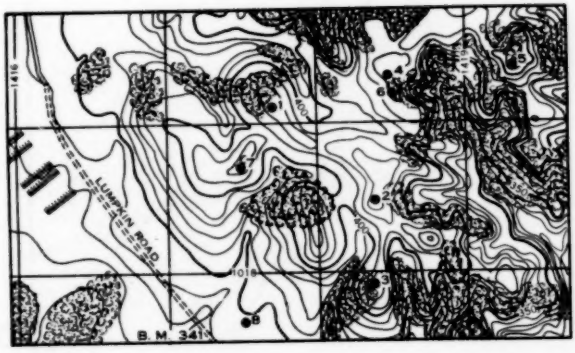

FIGURE 62.

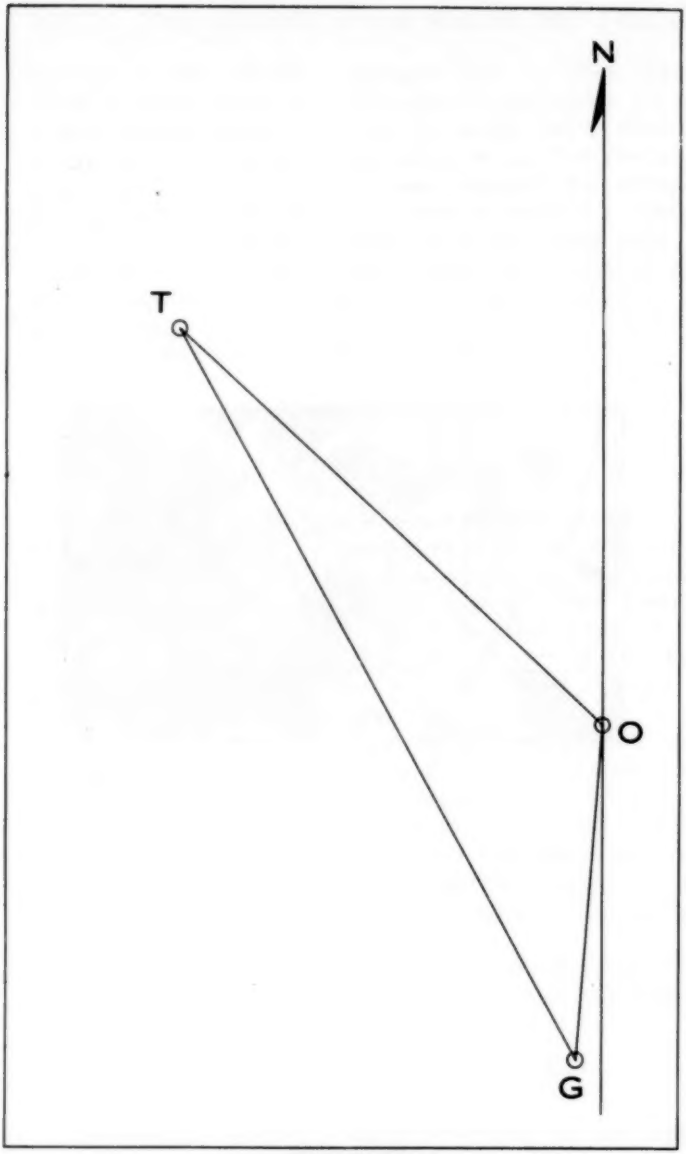

FIGURE 63.

direction of the target at *T* hidden from them by the woods.

SOLUTION

On the plotting (Figure 63) measure, with the protractor, the angle *G*. Direct the crew to lay on the gun on the point *O*. Then have them turn the gun to the left through the angle *G*.

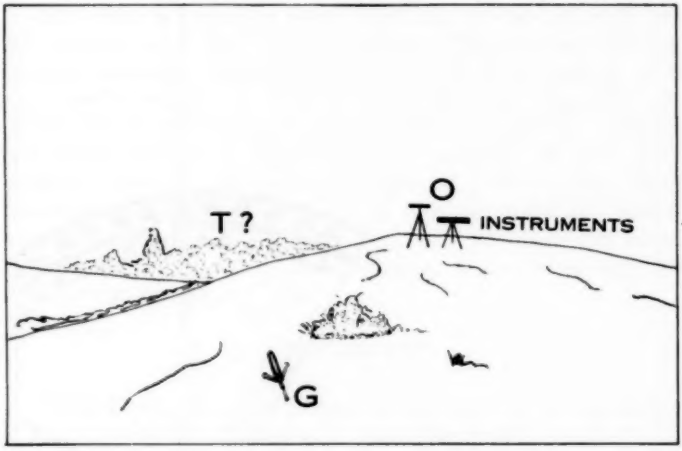

FIGURE 64.

SITUATION CONTINUED

The angle *G* through which the gun has just been turned from *O*, in order to point toward *T*, is called the *base angle*.

REQUIREMENT

In this problem is the base angle right or left? What does it measure in mils?

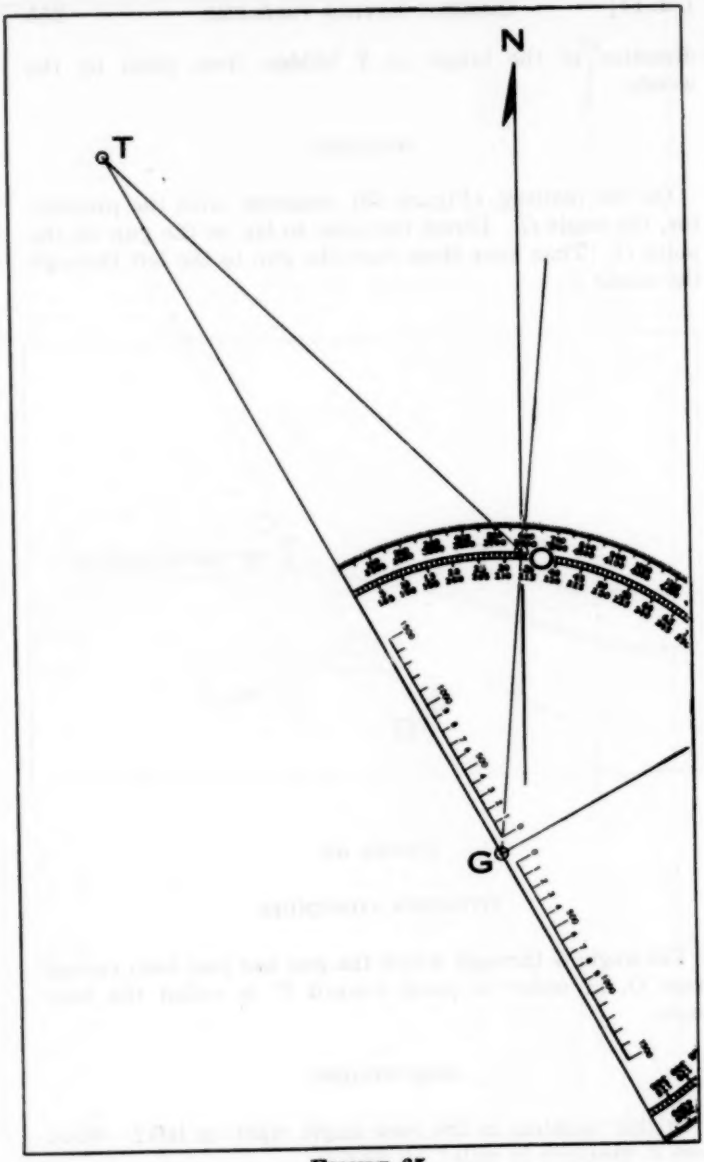

FIGURE 65.

SOLUTION

Left 595 mils. Figure 65 shows how the protractor is placed to measure an angle. (Note that the line *OG* must be prolonged so that it intersects the curved edge of the protractor.) This angle is *left* because the gun turns to the left from its initial aiming point (*O*).

SITUATION CONTINUED

The instruments you have with you at the point *O* are an aiming circle and a range finder. The aiming circle is a very accurate instrument, similar in its functions to a surveyor's transit. It is used for measuring magnetic azimuth, but is graduated in mils instead of degrees. (There are 6400 mils in a circumference,—roughly 18 mils to a degree. Hence a magnetic reading of 1600 is east, 3200 is south and 4800 is west.) The aiming circle also measures "angles of site", a term that will be explained later. The range finder, as its name implies, is an instrument for measuring ranges.

REQUIREMENT

Using these two instruments what data was it necessary for you to obtain in order to plot Figure 63.

SOLUTION

The direction or azimuths from *O* to *G*, and from *O* to *T*. Also the ranges *O* to *G*, and *O* to *T*.

SITUATION

Here are the data which you obtained at *O*.

	O-G	*O-T*
Azimuth	3255	5540
Range	552	968

REQUIREMENT

Using your protractor and the above data, plot points *G* and *T*. Then draw the line: *G-T*. Find the range: *G-T*. Measure the base angle.

SOLUTION

Your figure should be the same shape as Figure 2. The base angle is L595. The range: *G-T* is 1385 yards. A variation of 5 mils or yards is permitted.)

DISCUSSION

The method of plotting is as follows: Using the straight edge draw a line near the right edge of the sheet of plotting paper. Exactly on this line, and near its center, prick a point with the pin or thumb tack. Enclose the point in a small circle. Label the point *O*. Consider this straight line as a magnetic north-south line, the upper end being north. Put an arrow labeled *N* at the north end of the line to indicate that direction. Place the protractor on the paper with its center exactly on the point *O* and with the orienting line on the north-south line. (See Figure 66.) You are now ready to lay off the two azimuths that were read with the aiming circle from *O*. These are both greater than 3200; hence the graduations on the protractor which begin at 3200 and run to 6400 must be used. (There are 6400 mils in a complete circle, but the protractor is only half of a circle. Therefore it has two scales, one running from 0 to 3200 with which all angles from north through east around to south are measured, and another scale running from 3200 to 6400 with which all angles greater than 3200 are measured. Angles between 3200 and 6400 can also be measured by back azimuth as described in the note that follows.)

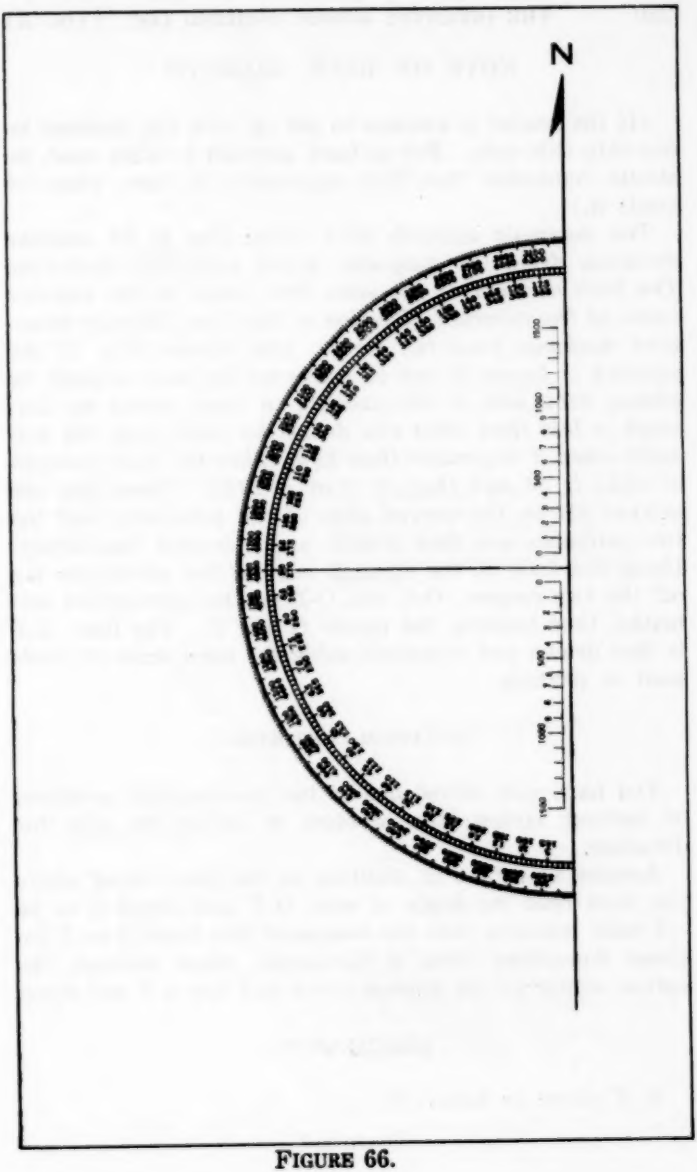

FIGURE 66.

NOTE ON BACK AZIMUTH

(If the reader is anxious to get on with the problem he can skip this note. But as back azimuth is often used, he should remember that this explanation is here when he needs it.)

The magnetic azimuth of a given line is its angular deviation from the magnetic north measured clockwise. *The back azimuth of the same line would be the angular value of the reversed direction of this line likewise measured clockwise from the north.* (*See Figure 67.*) *If the azimuth is known it can be converted to back azimuth by adding 3200 mils to the azimuth in cases where the azimuth is less than 3200 and deducting 3200 from the azimuth when it is greater than 3200. Thus the back azimuth of 3255 is 55 and that of 5540 is 2340.* These two are pricked off on the curved edge of the protractor and the two azimuths are then drawn and extended indefinitely. Using the scale on the straight edge of the protractor lay off the two ranges: *O-G* and *O-T* on the appropriate azimuths, thus locating the points *G* and *T*. The line: *G-T* is then drawn and *measured* using the same scale of yards used in plotting.

SITUATION CONTINUED

You have now solved one of the fundamental problems of indirect laying: the problem of laying the gun for direction.

Assume now that in addition to the data listed above you have read the angle of site: *O-T* and found it to be —2 mils, meaning that the measured line from *O* to *T* inclines downward from a horizontal plane through the optical center of the aiming circle and has a 2 mil slope.

REQUIREMENT

Is *T* above or below *O*?

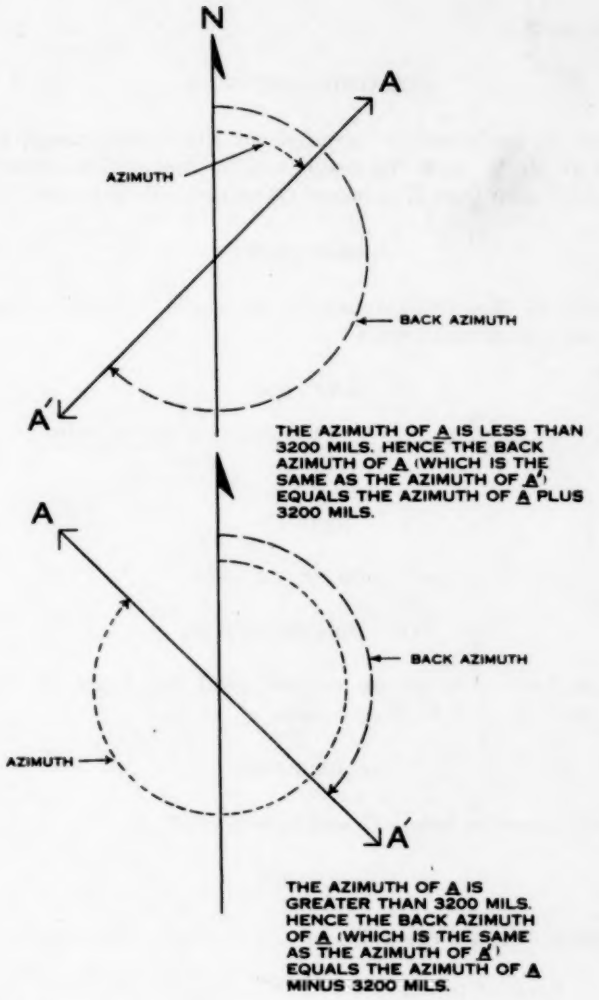
N
A
AZIMUTH
BACK AZIMUTH
A'
THE AZIMUTH OF A IS LESS THAN 3200 MILS. HENCE THE BACK AZIMUTH OF A (WHICH IS THE SAME AS THE AZIMUTH OF A') EQUALS THE AZIMUTH OF A PLUS 3200 MILS.
A
BACK AZIMUTH
AZIMUTH
A'
THE AZIMUTH OF A IS GREATER THAN 3200 MILS. HENCE THE BACK AZIMUTH OF A (WHICH IS THE SAME AS THE AZIMUTH OF A') EQUALS THE AZIMUTH OF A MINUS 3200 MILS.

FIGURE 67.

SOLUTION

Below.

SITUATION CONTINUED

Now if you multiply the angle of site by the range, and then divide by 1000 the result will be the vertical interval (the distance that *T* is below *O*) expressed in yards.

REQUIREMENT

What is this vertical interval in yards? (Don't forget the plus or minus sign.)

SOLUTION

$$\text{Vertical interval} = \frac{\text{Range} \times \text{Angle of site}}{1000}$$

$$= \frac{968 \times -2}{1000}$$

$$= -1.93 \text{ or } -2 \text{ yards.}$$

SITUATION CONTINUED

You have also, let us assume, read the angle of site: *O-G* and found it to be −4 mils.

REQUIREMENT

Is *G* above or below *O* and how much?

SOLUTION

Below, because the angle of site is minus (downhill).

$$\text{Vertical interval} = \frac{\text{Range} \times \text{Angle of Site}}{1000}$$

$$\frac{552 \times -4}{1000} = -2.2 \text{ or } -2 \text{ yards}$$

This operation in arithmetic by means of which you found the vertical interval is generally expressed as follows:

$$\text{W (Vertical Interval)} = \frac{\text{R (Range)} \times \text{M (Angle of site)}}{1000}$$

This is called the "mil formula".

SITUATION

You have found that *T* is 2 yards lower than *O*, and that *G* is also 2 yards lower than *O*.

REQUIREMENT

Is *T* higher or lower than *G*, and what is the vertical interval?

SOLUTION

They have the same elevation. The VI (vertical interval) is zero.

SITUATION

Since the gun and target are at the same elevation, a straight line joining the two must be horizontal. This line, joining gun and target, is called the "line of site".

REQUIREMENT

How can the gun be laid so that it will be pointing directly along this line of site by use of the machine gun clinometer? (The clinometer applies the principle of a carpenter's level and permits setting off vertical angles from the horizontal and applying them to the gun).

SOLUTION

By setting the clinometer at zero and placing it on the

gun, and then by manipulating the hand wheel, elevating or depressing the gun until the bubble is centered.

SITUATION

Assume that the gun is so laid along the line of site and that a round is then fired.

REQUIREMENT

How far along the line of site will the bullet travel?

SOLUTION

It will not travel along the line of site at all. Under the force of gravity it will start curving downward as soon as it leaves the muzzle.

REQUIREMENT

What must be done to compensate for this downward curve and thus make the bullet travel the entire distance to the target?

SOLUTION

The muzzle must be elevated above the line of site by manipulating the elevating hand wheel.

SITUATION

The angle through which the barrel must be elevated above the line of site is called the "angle of elevation", or AE. Angles of elevation are listed in Table I, Fire Control Data. They vary with the range. In this case the range: gun-target is 1385 yards.

REQUIREMENT

From Table I, Fire Control Data, (pages 276-277) what

is the angle of elevation corresponding to a range of 1385 yards? If you cannot figure it out, make a guess.

SOLUTION

23.5 or 24 mils. The AE for 1400 yards is 24.0 mils. The AE for 1300 yards is 21.0 mils. The difference, listed in column 3, is 3 mils. Thus at this range, 3 mils corresponds to a change in range of 100 yards. A change of 85 yards requires 0.85 $\times$ 3 mils or 2.55 mils. Hence the AE for 1385 yards is 21.0 + 2.55 or 23.55 mils. In whole numbers this is 24 mils.

PROBLEM NO. 2

SITUATION

Refer again to the map, Figure 62. Your gun is at the point *6*, your OP at *7*, and the target at *8*. Assume that with your aiming circle and range finder you have collected the following data:

	OG	*O-T*
AZ	1090	3178
RM	1145	1040
AS	+4	−25

REQUIREMENT

Plot the figure *TOG*. Measure and record the base angle and the range: *G-T*.

SOLUTION

The plot is shown in Figure 68. The base angle is L529. The range: *G-T* is 1865.

REQUIREMENT

Is *G* above or below the point *O*? Using the mil formula find the vertical interval. The mil formula is as follows:

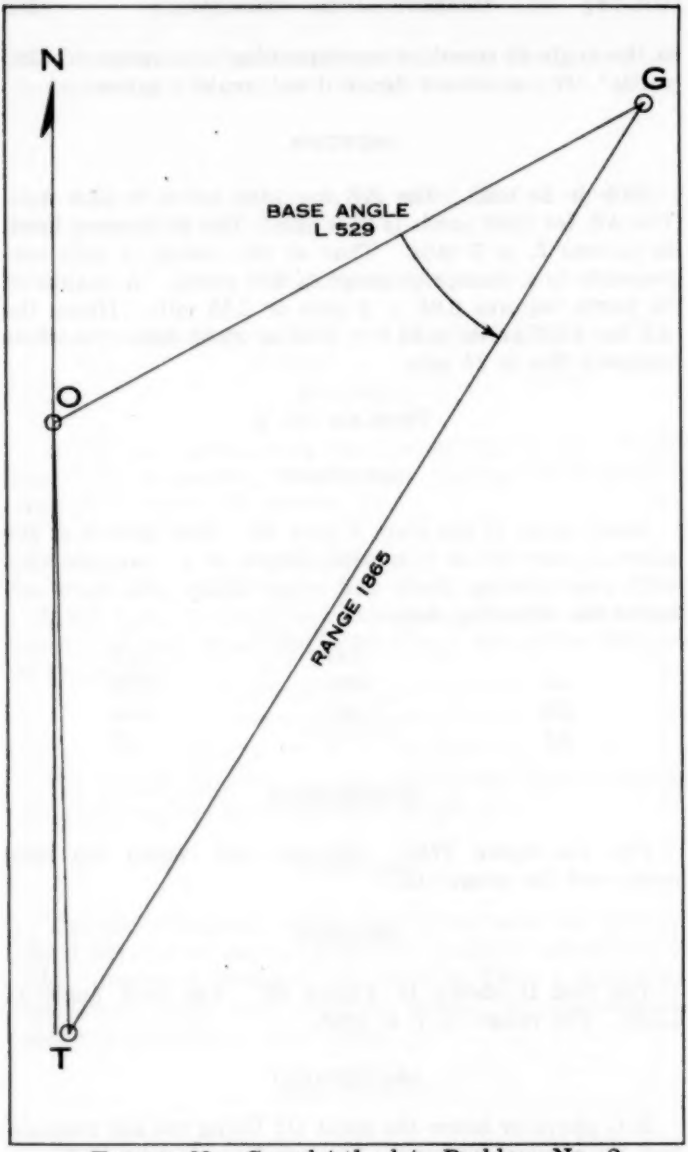

FIGURE 68.—Completed plot, Problem No. 2.

$$W = \frac{R \times M}{1000}$$

(W = VI, and M = AS)

SOLUTION

The VI is computed as follows:

$$W = \frac{R \times M}{1000} = \frac{1145 \times 4}{1000} = +4.58 \text{ or } +5 \text{ yards.}$$

(The plus before 5 indicates that *G* is the indicated distance above *O*.)

REQUIREMENT

Is *T* above or below *T*? What is the VI?

SOLUTION

T is below *O*.
The VI is computed as follows:

$$W = R \times M = 1040 \times (-25) = -26 \text{ yards.}$$

SITUATION

G is 5 yards above *O*, *T* is 26 yards below *O*.

REQUIREMENT

Is *T* above or below *G*? What is the VI?

SOLUTION

T is below *G*. The VI is −31 yards.

REQUIREMENT

Is the line of site: *G-T*, horizontal? Does it slope uphill or downhill from the gun to target?

SOLUTION

It is not horizontal. It slopes downhill.

REQUIREMENT

Using the VI: *G-T* (−31 yards), and the range: *G-T* (1865 yards), determine the angle of site.

SOLUTION

The mil formula was given originally in the form,

$$W = \frac{R \times M}{1000}$$

This may be expressed as

$$M = \frac{1000 \times W \text{ (Vertical interval)}}{R \text{ (Range)}}$$

W is −31 yards, R is 1865 yards; hence—

$$M = \frac{1000 \times (-31)}{1865} = -16.6, \text{ or } -17, \text{ mils.}$$

−17 mils, then, is the angle of site.

REQUIREMENT

How can the gun be laid so that the axis of the bore will be pointing directly along the line of site?

SOLUTION

Apply the clinometer set at −17, and manipulate the gun up or down until the bubble is centered.

SITUATION

Assume that the gun is so laid, and that a shot is fired.

REQUIREMENT

Will the bullet reach the target?

SOLUTION

No. It will start curving downward, immediately upon leaving the muzzle.

REQUIREMENT

What must be done to compensate for this downward curve and cause the bullet to carry the entire distance to the target?

SOLUTION

The gun must be elevated through the angle of elevation.

REQUIREMENT

Using Table I, determine the AE for a range of 1865 yards.

SOLUTION

AE 1800 yards	39 mils
65 yards	3 mils
	42 mils

The figure "3.0" mils is obtained by multiplying the difference in column 3, Table I (5) by 0.65 = 3.2, or in even figures 3.0.

The AE is therefore 42 mils.

SITUATION

Now recall that the gun was first laid along the line of site; that is, −17 mils below the horizontal. It is now raised above the line of site through the AE which is 42 mils.

REQUIREMENT

Does the gun now point above or below the horizontal, and how much?

SOLUTION

Above the horizontal 25 mils. expressed as *plus 25 mils.*

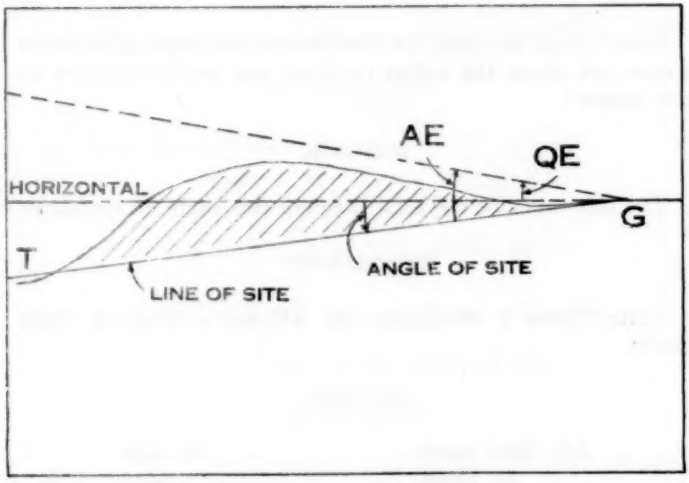

FIGURE 69.

DISCUSSION

The angle at which the gun is laid above or below the horizontal is called the "quadrant angle of elevation", and is usually referred to as the "QE" or "Quadrant".

PROBLEM NO. 3.

SITUATION

Refer again to the map, Figure 62. Assume, for this problem, that your gun is at the point *1* and the target at *5*. You have established an OP at *4* from which you have collected the following data:

	O-T	*O-G*
AZ	1530	4555
RM	840	820
AS	+10	−6

REQUIREMENT

Plot the Figure *TOG*. Measure the range: *G-T*, and the base angle.

SOLUTION

Figure 70 shows the completed plotting. The range: *G-T* is 1655 yards. The base angle is Right 88 mils.

REQUIREMENT

Using the mil formula, compute the VI: *O-G*, and the VI: *O-T*.

SOLUTION

$$W = \frac{R \times M}{1000}$$

$$\text{VI: } O\text{-}G = \frac{820 \times (-6)}{1000} = -5 \text{ yards}$$

$$\text{VI: } O\text{-}T = \frac{840 \times 10}{1000} = +8 \text{ yards.}$$

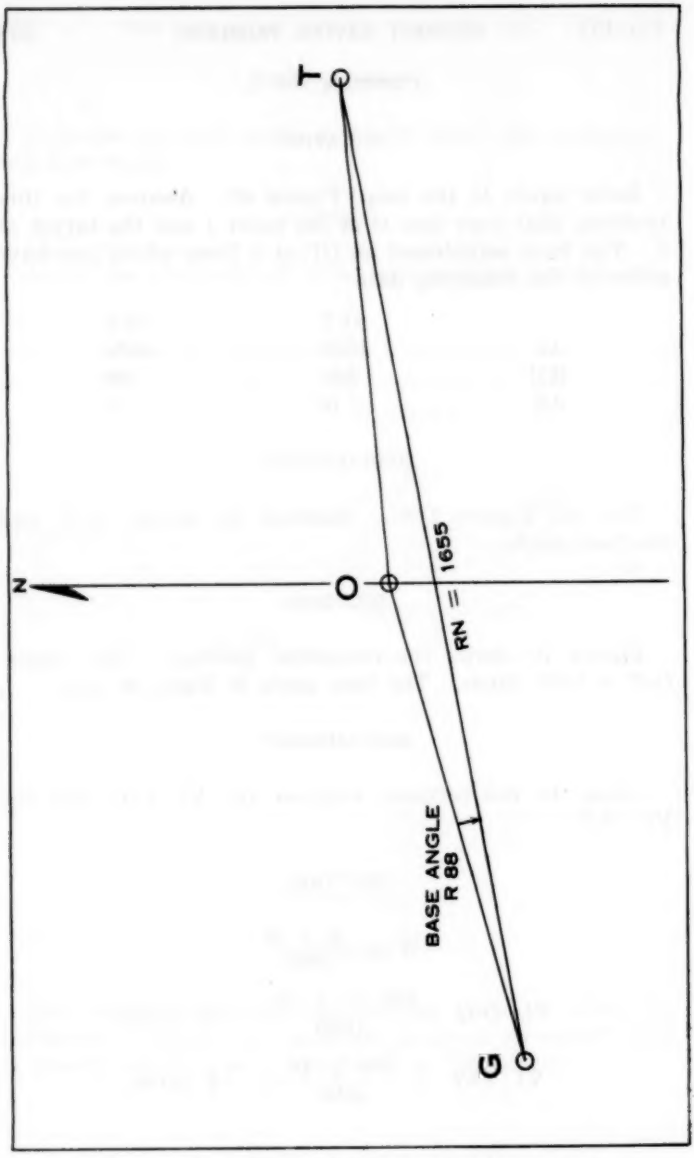

FIGURE 70.—Completed plot, Problem No. 3.

REQUIREMENT

What is the VI: *G-T*? What is the angle of site: *G-T*?

SOLUTION

G is 5 yards below *O*. Hence *O* must be 5 yards above *G*. *T* is 8 yards above *O*. *T* is hence 8 + 5, or 13, yards above *G* and the VI: *G-T* is +13 yards. Applying the mil formula,

$$M = \frac{1000 \times W}{R}$$

$$\text{M} = \frac{1000 \times 13}{1655} = 7.8 \text{ or } +8 \text{ mils.}$$

SITUATION

Assume that the gun is so laid that it is pointing along the line of site; that is, the bore of the gun is pointing 8 mils above the horizontal.

REQUIREMENT

What must be done so that any rounds fired will carry the entire distance to the target?

SOLUTION

It must be raised through the angle of elevation. The AE for 1655 is 33 mils.

SITUATION

The gun was first laid at +8 mils (angle of site), and then elevated through an additional angle of 33 mils.

REQUIREMENT

Does it now point above or below the horizontal, and how much?

SOLUTION

Plus 41 mils.

REQUIREMENT

What is this angle of 41 mils called?

SOLUTION

The QE.

GENERAL

SITUATION

There are tabulated below the angles of elevation, angles or site, and the QE's pertaining to the three problems solved.

	Problem No. 1	Problem No. 2	Problem No. 3
AE	24	42	33
AS	0	−17	+8
QE	+24	+25	+41

REQUIREMENT

a. How is the QE determined?
b. Is the AE ever negative?
c. When would the QE be negative?

SOLUTIONS

a. The QE is the AE plus or minus the angle of site.

b. The AE is always positive since the gun must be elevated to compensate for the downward pull of gravity.

c. The QE is negative in rare cases when the angle of site is both negative and larger than the AE. For example:

AE	10
AS	−20
QE	−10

REQUIREMENT

What two imaginary lines form:

a. The angle of site?

b. The AE?

c. The QE?

SOLUTIONS

a. The horizontal and the line of site.

b. The line of site and the axis of the bore when the gun is correctly laid to hit the target.

c. The axis of the bore and the horizontal.

(*NOTE.*—The subject of Machine-Gun Indirect Laying has been covered at greater length and provided with more advanced illustrative problems in Special Text No. 8, Army Extension Courses, 1935. This text can be obtained from The Book Shop, The Infantry School, Fort Benning, Georgia.)

FIRE CONTROL DATA, CAL. 0.30 BALL AMM., M1

TABLE I			TABLE II		TABLE III	
RANGE	AE	DIFF	TROOP SAFETY	DIFF	MASK CLEAR	DIFF
100	1		79		2	
		1		37		1
200	2		42		3	
		1		12		1
300	3		30		4	
		1		4		1
400	4		26		5	
		1		3		1
500	5		23		6	
		1		1		1
600	6		22		7	
		1		1		2
700	7		23		9	
		2		2		2
800	9		25		11	
		2		2		2
900	11		27		13	
		2		3		2
1000	13		30		15	
		2		3		2
1100	15		33		17	
		3		4		3
1200	18		37		20	
		3		4		3
1300	21		41		23	
		3		4		3
1400	24		45		26	
		3		5		3
1500	27		50		29	
		4		5		4
1600	31		55		33	
		4		5		4
1700	35		60		37	
		4		6		4
1800	39		66		41	
		5		7		5
1900	44		73		46	
		5		7		5
2000	49		80		51	
		5		7		5
2100	54		87		56	
		5		8		6
2200	59		95		62	
		6		8		6
2300	65		103		68	

TABLE I			TABLE II		TABLE III	
RANGE	AE	DIFF	TROOP SAFETY	DIFF	MASK CLEAR	DIFF
2300	65		103		68	
		6		8		6
2400	71		111		74	
		6		9		6
2500	77		120		80	
		7		10		7
2600	84		130		87	
		7		10		7
2700	91		140		94	
		7		11		7
2800	98		151		101	
		7		12		8
2900	105		163		109	
		8		12		8
3000	113		175		117	
		8		13		8
3100	121		188		125	
		9		14		9
3200	130		202		134	
		9		14		9
3300	139		216		143	
		9		16		10
3400	148		232		153	
		10		16		10
3500	158		248		163	
		10		17		11
3600	168		265		174	
		11		19		12
3700	179		284		186	
		11		20		12
3800	190		304		198	
		12		22		12
3900	202		326		210	
		12		24		13
4000	214		350		223	
		13		27		14
4100	227		377		237	
		14		29		14
4200	241		406		251	
		14				16
4300	255				267	
		16				
4400	271					
		16				
4500	287					
4600						